
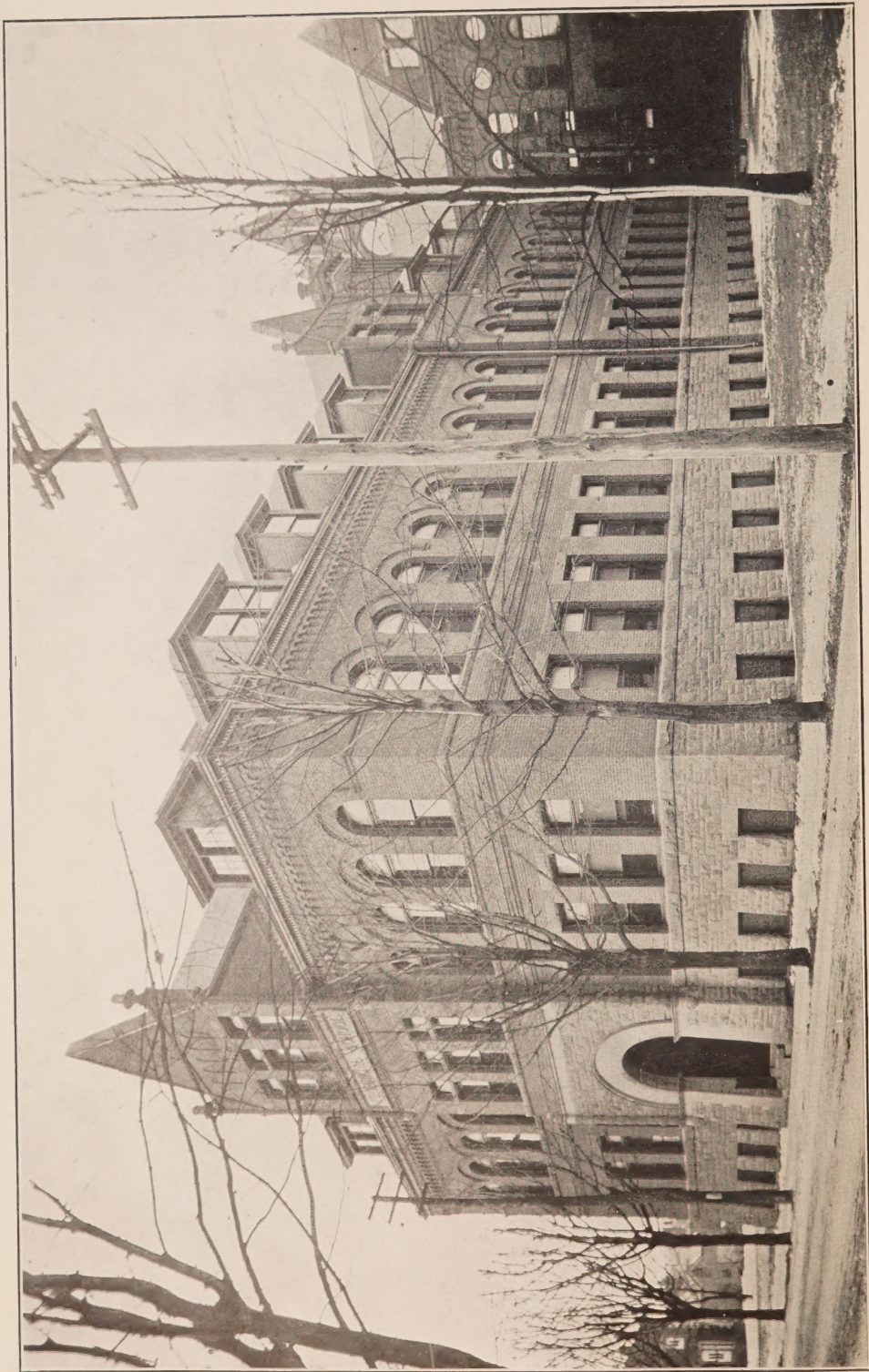


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TECHNICAL AND ART SCHOOL, HAMILTON
The Pioneer Industrial School of Ontario

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ONTARIO
DEPARTMENT OF EDUCATION

EDUCATION

FOR

INDUSTRIAL PURPOSES

A REPORT

BY

JOHN SEATH

1844-1919

Superintendent of Education
for Ontario




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PREFATORY LETTER

To the Honourable R. A. Pyne, M.D., LL.D.,
Minister of Education for Ontario, Toronto.

Sir,—In accordance with your instructions of August, 1909, to report upon a desirable and practicable elementary system of technical education in Ontario, after inquiry into those already existing in some of the countries of Europe and the States of the Union, I visited in September and October of that year a number of elementary and intermediate technical schools in England, Scotland, France, Germany, and Switzerland; and in May of 1910 a number of others in the State of Massachusetts and the City of New York. In December, 1909, I also attended the Annual Convention of the National Society for the Promotion of Industrial Education, held at Milwaukee, Wisconsin, and embraced the opportunity of visiting the Trade School of that city. This branch of education is, of course, not a new field for educationists, and I have accordingly been able to avail myself of the fairly extensive literature on the subject. I have, also, as occasion offered, discussed the problem under consideration with employers and employees; and I have made special visits to most of the centres in Ontario that may be expected to take the initiative in providing suitable schools. A good deal of the information contained in this report I owe, I may add, to an extensive correspondence I have also carried on with Ontario manufacturers and other employers of labour and with educationists in the various countries I visited during my tour.

Having in 1900 visited the New England States and the State of New York, to report upon their Manual Training and Trade Schools, I was fortunately able to approach the subject of my present report with some knowledge of the question. As, however, I had only two months for my visit to Europe, on my arrival in London I obtained from the English Board of Education (which corresponds to our Department of Education) a list of representative schools of different types in England and Scotland, as well as in France, Switzerland, and Germany. These schools are situated in London, Manchester, Liverpool, Edinburgh, Glasgow, Paris, Bern, Bienne, Zurich, Munich, Cologne, and Aix-la-Chapelle. To the favour of the foregoing list the Board added letters of introduction to the educationists who were best able to aid me in my investigation. The list of schools and the letters of introduction I found to be of great service; for they enabled me to utilize to the best advantage the short time I had at my disposal. In this connection I must acknowledge in particular the assistance I received from Dr. Jamieson, of the English Board of Education, who, having been a "colonial" himself (he

was for some time a School Inspector in South Africa), was deputed by Sir Robert Morant, the head of the Enquiries Department, to forward my cause in every way possible. I had also the benefit of the advice of Mr. M. E. Sadler, Professor of the History and Organization of Education in Manchester University, and a recognized authority on the subject of elementary technical education. In London I received all the assistance I needed from the officers of the London County Council, in Manchester from Director Reynolds, and in Liverpool from Director Legge. In Paris I received information and direction from M. Bedourez, Director of Elementary Education for the Department of the Seine, and in Switzerland from Professor Fritsch, of the Pestalozzianum, Zurich, who is both a leading educationist and a member of the Federal Parliament. For an account of the educational system in Bavaria and the German Empire, both during my visit and by subsequent correspondence, I must acknowledge my indebtedness to Dr. Kerschensteiner, Superintendent of Education of the City of Munich. From Professor Borchers, of the "Technical High School" at Aix-la-Chapelle, who had been deputed by the Prussian Minister of Trade and Industry to assist me in my inquiries, I obtained a knowledge of the system in the German Empire, as well as in Prussia.

On the Continent of Europe it is not easy to obtain entrance to the schools. But the schools of the United States are freely open to the visiting educationist. State officials, superintendents, and principals and staffs place their services at his disposal. In that country I visited the industrial and technical schools of Milwaukee, New York City, Springfield (Mass.), Worcester, Fitchburg, and Boston. Everywhere I received most courteous and friendly treatment.

I have also pleasure in acknowledging the assistance I received from Inspector Leake, of your department, in preparing my survey of the present provision for technical education in this Province.

In accordance with your instructions, I now submit for your consideration an account of the provisions for elementary technical education in the various communities I visited; and, to make my account more readily understood by the general public, I have, where practicable, substituted the nearest Ontario equivalents for foreign terms. In gathering material I kept in mind the importance of the following topics:—

1. The evolution of the systems of technical education in the countries I visited;
 2. The relation of the schools to the central governments and the municipalities;
 3. The sources of financial support;
 4. The attitude of employers and workmen;
 5. The composition and powers of the boards of management;
 6. The qualifications of the teachers and the provision for training them;
- and

7. *The courses of study and their organization.*

To the last of these topics I have given a large amount of space. At this juncture they will be found, I believe, to be serviceable. Many in the Province do not know what is connoted by the terms *Technical and Industrial Education*, and to those who do know I have tried to supply desirable but not readily accessible details.

In accordance also with your instructions, I submit a statement of the changes that appear to me to be necessary, if our system of education for industrial purposes is to be both modern and adequate.

The lateness of the date at which I present this report is due partly to the pressure of my regular official duties and partly to delays in securing recent and reliable information; partly, also, to the labour involved in collating and digesting the large and varied mass of material at my disposal.

I have the honour to be, sir,

Your obedient servant,

JOHN SEATH,

Superintendent of Education.

Ontario Department of Education,
December, 1910.

GENERAL INTRODUCTION

A few words by way of introduction. For a varying number of years the problem of Education for Industrial Purposes has engaged the attention of almost every country in Europe and almost every state of the Union, as well as of almost every province of our own Dominion. The present importance of the problem is the result of three main causes:

1. The rivalry amongst the nations for commercial supremacy;
2. The imperfect provision for training skilled workmen; and
3. The modern extension of the scope of education to include vocational as well as cultural training, administered and maintained wholly or largely at the public expense.

Of the foregoing causes the most potent is the keen rivalry amongst the nations for the control or at least a due share of the markets of the world—a rivalry which is continually being intensified by increasing facilities for communication and transportation. Of this rivalry the general desire for wealth is, of course, a leading cause. But there are others. The growth of their populations has forced some countries to supplement by importation their supply of food stuffs, and these they generally pay for with manufactured goods. Some of such countries have enough raw material for their own factories and for exportation. Others again, are forced to import it in varying amounts. Wherever, in particular, goods are manufactured for export, skilled labour is becoming more and more a necessity; for the markets are controlled by the countries that produce the best and cheapest goods, and “a market once won must be kept by constant striving, for the prizes are ‘challenge cups,’ to be held against all comers.”

Secondly, owing to changes in industrial organization, the old means of providing skilled labour has practically disappeared. Under the system of apprenticeship as it existed in the countries of Europe the master workman was both merchant and craftsman; he himself carried on all the operations of his trade. His apprentice, who in turn became a master workman, was both assistant and learner, and it was to the master's advantage to make his training as thorough and complete as possible. Later the journeyman appeared, but for a long time he marked only a stage in the development of the master workman, and did not interfere with the status of the apprentice. The situation, however, was different after the Industrial Revolution and the introduction of the capitalist. The shop of the master workman was then replaced by the modern factory, and the master workman himself by the financial director, the superintendent or foreman, and the merchant. Then, also, disappeared the provision for the systematic training of the apprentice; for it was not to the interest of the superintendent or foreman to give him such training. The place of the apprentice has, accordingly, been taken by the “helper,” or “improver,” or “junior,” or the so-called “apprentice,” who picks up his trade

as best he can, assisted sometimes by his fellows or by the foreman. And the introduction of the capitalist has produced another effect. With expensive establishments and close competition the manufacturer must produce at the least possible cost. One most important count in this production is the comparative cheapness of specialized labour. Owing to the development of machinery a boy may now, in a short time, become expert in performing a single operation in a process of manufacture which consists of many operations. It pays his employers to keep him at this operation. He has little or no interest in having the boy taught his trade. But the boy must be taught. If the manufactures of a country are to flourish it must provide its own skilled workmen and its own skilled foremen.

Stimulated, no doubt, by the two conditions described above, the modern educationist has revised his definition of education. Formerly it embraced almost wholly cultural training. Now it embraces both cultural and vocational. He now holds that every citizen should be so trained as to be able to discharge his duty to himself and his family as well as to the state. Modern psychology has shown him that what best fits the child for his place in society best develops him morally, mentally, and physically. Moreover, owing to the growth of democratic ideas, education has come to be regarded as a charge to be maintained and administered wholly or largely at the public expense. At present in England, Austria, Belgium, France, Germany, Italy, and Switzerland its maintenance and administration are held to be a national duty. In most of the States of the Union, however, the responsibility is local; but even here the doctrine of state responsibility has already made some progress. To-day, accordingly, the modern educationist everywhere joins with the manufacturer and the merchant in pressing for technical training maintained wholly or largely at the public expense.

As to the problem itself of education for industrial purposes, it will have been solved when we know how to recruit the skilled trades from time to time without overcrowding them, and to train the workers therein so that they shall become the best possible, and at the same time to develop conditions that may give them an increasingly better livelihood as well as a due share of their labour. The kind of education needed is well set forth by the President of the Textile Workers' Union of America:

"The same keen desire is in the hearts of all parents to see their boys make good, not as industrial specialists, as simply parts of a machine, where nothing counts but speed and production, but as men and women whose early training and education will equip them to grasp the higher technique of any trade or calling they may be best fitted for, to know the way a thing is done, why it is done, and the very best and most artistic way of doing it, coupled with an economic knowledge of the value of their labour."

Another matter: A continual source of confusion in dealing with the subject of my report is the looseness with which the terms Manual Training, Industrial Education, Technical Education, and Vocational Education are

constantly used. It is, accordingly, necessary that I should define them as they are now understood where the organization is best.

In any system of primary and secondary education both the hand and the brain should be trained to act together and to help each other. Without this training the education would be incomplete. Manual Training is the process by which this object is attained. The courses include the "constructive" work and needle work of the lower forms of the elementary schools, and the wood and iron work and the household science of the secondary schools and the higher forms of the elementary schools. At first educationists recognized only the cultural value of manual training; now they recognize as well its practical value in ordinary life and its value as an initiation into industrial processes.

The term Industrial Education is applied, in its limited sense, to general courses which prepare for any trade, as well as the special courses which prepare for individual trades. In many countries it includes, also, the education of those engaged in transportation. It deals with both theory and practice; but in all the schools that provide it, especially in the Trade Schools, the emphasis is on the practice. Locally, it should be added, the term has a still more limited meaning, being applied to the courses in those schools in which are trained, for various manual occupations, the waifs and strays from the elementary schools.

The term Technical Education is applied, in its limited sense, to the courses provided for those who are designed for the higher directive positions in connection with the industries; that is, the courses for overseers and superintendents, as well as for students of the technological schools and the university departments of Applied Science. Here, however, the emphasis is on the theory, and machinery and other apparatus are generally used only to establish the connection between the theory and the practice. Quite mistakenly in Ontario the term Technical has been applied to the cultural and practical courses in Manual Training and Household Science. With greater appropriateness, however, it is applied to both Industrial and Technical Education, as defined above. Accordingly, when in this report the context makes the meaning clear I will use each of the terms in its more limited sense, and the term Technical to include both.

By Vocational Education we mean the courses that prepare for any "vocation," or calling, in life, whether it be industrial, agricultural, house-keeping, commercial, or professional.

In the preceding statement I have not referred to Agricultural Education. In the discussion of the problem of education for industrial purposes agriculture has hitherto held a subordinate place. In it for ages the practical knowledge has been transmitted with more or less theory from father to son. Modern commercial rivalry and the modern conception of the scope of educa-

tion have, however, given it an important place amongst the subjects of vocational training. As will be seen later, agricultural education is both industrial and technical, and the Nature Study of the public school, when associated with the school garden, may rightly be classed as Manual Training. As a matter of usage, however, the term Industrial, in its limited sense, is confined to the trades, and does not include the term Agricultural.

Education for industrial purposes includes also Commercial Education. The latter is the handmaiden of the agriculturist and the manufacturer, as well as of the merchant, and is, accordingly, entitled to a place in any discussion of the general theme.

ENGLAND

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ENGLAND

INTRODUCTION

Long after her neighbours, England woke to the necessity for popular education. Not, indeed, until the Education Act of 1870^{Education Acts of 1870 and 1902.} did she recognize provision for even elementary education as a national duty. Before then the state aided schools had been for the "labouring classes" only. The next most important act—and indeed the most important act in the history of education in England—was passed in 1902, supplemented as regards London by an act of the following year. Since then most remarkable progress has been made in every branch of education. These acts provide for both elementary and higher education, and substituted for the School Boards, the County Councils and County Borough Councils as Local Education Authorities for their districts. Every such authority appoints an Education Committee, which generally works through a number of sub-committees. A majority of such education committees consists of persons who are members of the Council, unless, in the case of a County, the Council determines otherwise; and the other members are appointed on the nomination or recommendation, when it appears desirable, by other bodies, of persons experienced in education, or are co-opted directly by the Council as being persons acquainted with the needs of the various kinds of schools in the district for which the Council acts. Provision is also made for the inclusion of women as members of the committee. The powers of our Boards of Trustees are, therefore, exercised in England by the County Councils through committees thereof containing the co-opted members mentioned above. Such committees report to the Councils, and the Councils may transfer to them all their powers under the Act, except that of levying rates and borrowing money.

The duties of the local education authorities include the control of secular education in all Elementary Schools (our Public Schools), whether Council Schools, or Voluntary Schools (that is, schools not provided by local education authorities, and denominational in character), as well as the supply or aiding of higher education. In its discharge of the latter duty, the Council is often associated with other corporations, as in London, for example, with the University of London, the city companies, and the governing

Financial support.

bodies of secondary schools and of technical institutions. The majority of such schools are supported partly by the State and partly by rates, though many schools are also endowed. The funds provided by the State are distributed through the Board of Education (corresponding to our Department of Education), which inspects the schools and has the power of withholding grants on the report of H. M. Inspectors on conditions similar to those in Ontario. A large number of secondary schools, however, receive no assistance from the Imperial Government or from the local educational authorities within whose districts they are situated. Such schools as, for example, Eton and Rugby, are managed by Boards of Governors, and are supported partly by fees and partly by the income from endowments.

General Organization of Elementary and Secondary Education.

A word as to the general organization of the system of primary and secondary education: The division between elementary and secondary education in England is a vertical one, not a horizontal one as in America. It is, therefore, not uncommon to find children of nine years of age receiving (so-called) secondary education. The distinction between the two types of schools was formerly a social one, but, since the Act of 1902, this distinction is rapidly disappearing. Further, there is a tendency to make the upper and lower age limits of secondary education twelve and eighteen years. As will be seen later, this is the tendency in France and Germany also. The lowest grade of schools, corresponding generally to our Public Schools, are known as Public Elementary Schools. Higher Elementary Schools (formerly Higher Grade Schools) are schools with a three or a four years' course. The name "High School" is generally reserved for girls' secondary schools founded since about 1870. The newer municipal and council secondary schools are known simply as Secondary Schools. The older secondary schools for boys are often termed Grammar Schools. Schools in England of the secondary grade may, accordingly, have very different names. Omitting the residential Public Schools, there are Grammar Schools (for boys), High Schools (for girls), and Municipal or Council Secondary schools (for boys or girls, or co-educational). The first three mentioned have generally a nine years' course through six forms; the last a four or six years' course through four or six forms. Age for age, pupils in all the foregoing types of schools are about equal in attainments. Greater emphasis, however, is placed on the classics in the older schools; on modern languages and science in the newer schools.

Growth of Technical Education.

In technical as well as in popular education, England has been a laggard. In commerce and industry she had had a long start, and not until she felt the pressure of competition from Germany and

France did she face the question of training her artisans. Until the great educational enactment of 1889, the Mechanics' Institutes were in the main the only means whereby the working and the middle classes continued or supplemented the inadequate provision of the day schools. These Institutes in the early days of the nineteenth century were the forerunner of what we now call Technical education. The inferiority of English manufactures, as demonstrated at the exhibition of 1851, led to parliamentary grants in aid of Science and Art classes. These were distributed by the Science and Art Department; so that one department controlled elementary education, and another the secondary and technical schools. The Act of 1899 fused these two departments, and the Act of 1902, already referred to, introduced unity into local administration. The Technical Institutions Acts of 1889 and 1891 had authorized the levying of a local tax of a penny in the pound for technical education, and, in addition, the local authorities receive considerable revenue from the Customs and Excise, and from the various Trade Guilds, which are both numerous and wealthy, especially in London. In recent years the amounts derived from the Customs and Excise have decreased considerably and the Government has promised to set aside a portion of the land tax to make up the deficiency. The Government has also given large grants for the support of technical education; but the general educational system of England has been so long in an unorganized condition that the technological branch is still behind those of the Continent of Europe.

Financial support.

The first result of the movement in favour of technical education was the establishment of many high grade technical schools and colleges, which, however, proved to be inadequate, because they did not reach the class that needed instruction most. So far as concerns the English workman, his technical education is now provided for by technical day classes, including "Trade Schools" and evening classes, to which should be added the Higher Elementary Schools, some of which provide courses with an industrial outlook, but without attempting instruction of a specifically technological character.

Provision for training workmen.

HIGHER ELEMENTARY SCHOOLS

Two types of the higher elementary school were recognized during the years 1906 to 1908. From 1901 to 1904, higher elementary schools provided four years' courses of instruction of a predominantly scientific character, and the minimum age of admission was ten. Under the Code of 1905 and subsequent Codes a new type was created which provided for only a three years' course; but

Types of Schools.

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| Aim. | the former requirements as to instruction in science have been withdrawn and the aim now is to continue the general education of the pupils and to provide them with instruction bearing on their |
| Organization. | future vocations, but not of a specialized character. Such curricula must provide "a progressive course of instruction in the English language and literature, in elementary mathematics, and in history and geography. Drawing and manual work for boys and domestic subjects for girls must be included in every case as part of the general or special instruction." Admission to these schools is, with some necessary exceptions, limited to pupils who are over twelve years of age and have been at least two years under instruction in a Public Elementary School. The schools must also be organized to give at least a three years' course, approved by the Board of Education; but this course may be extended if, in the opinion of the Inspector, the pupils would profit thereby, and a suitable fourth year course has been organized. In the distribution of the Government grant, courses beyond that of the fourth year are not recognized. In this way the Board of Education sets the highest limit of the course for elementary education. The curriculum varies according to the locality; in some cases it has an industrial outlook; in others, a commercial one; and in others, it is of a general character. |
| How established. | Such Higher Elementary Schools are established either by local education authorities or by voluntary managers. In either case, the schools are supported by Government grants and by local rates imposed under the authority of the Council. Voluntary managers cannot, however, establish a Higher Elementary School without the |
| Character of the Schools in London and Liverpool. | consent of the local education authority. I visited two of these schools in London and one in Liverpool. From what I saw and the discussion I had with those in authority, I should conclude that they are not yet free from the influence of the Science and Art classes they replaced, and that their industrial courses need to be made less bookish and more practical, and to be brought into closer relation with local requirements. |

TECHNICAL SCHOOLS

I. DAY SCHOOLS

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| Aim and scope. | Besides the Higher Elementary Schools, the Board of Education may authorize the establishment of Technical Day Schools, including Trade Schools. Such schools are intended to occupy, to the best advantage of the boys and girls and of the industry they may enter, the interval between leaving the Public Elementary School and entering on their apprenticeship. In England, as elsewhere, the rise of the capitalist and the specialization of industries |
|----------------|---|

and the subdivision of labour resulting therefrom have led to the decay of the old apprenticeship system and created the necessity for an educational instrument of this character. The tendency, however, appears to be averse to trade specialization. The opinion held by many is that the work-shop is the place to learn a trade; but that this process can be hastened by a previous education, which, besides a practical course, provides for other subjects related to such course. Owing to the adaptation of these schools to local conditions, the term Trade School is applied to schools with a varying amount of industrial outlook. It includes, for example, such schools as the Liverpool and Leeds Preparatory Trade Schools for boys, and the more elaborate London Trade Schools for boys and girls, and others of a similar but more advanced character. Accordingly, the curricula of these schools vary considerably. ^{Courses of Study.} It is usual where there is a three years' course—the pupils being taken out of the elementary school a year before they would ordinarily leave—for some eight hours to be given to English, eight or ten to Mathematics and Science, and eight or ten to Drawing and Manual work. In the later years somewhat less time is given to English. Differences are also made according to the group of allied trades, one of which the pupil is expected to enter.

The classes are usually held in the building of the technical institutions whose chief function is the evening class. In this way, duplication of accommodation and equipment is avoided and, what is educationally important, the pupil becomes familiar with the teachers and surroundings of institutions to which it is desirable he should return when he becomes an apprentice. ^{Accommodations.}

II. EVENING SCHOOLS

The Evening Technical Schools are intended for those who are already engaged in some occupation. The usual time for such classes is the evening, but classes on Saturday afternoons are recognized as being in the same category. The evening classes vary widely in scope, for they range from the small and elementary rural Continuation School to the highly specialized work done in the best equipped of the technical colleges. In the following statement I confine myself to the technical classes which are most widely provided, and which the apprentices and journeymen ordinarily attend. ^{Aim and scope}

In England the lowest grade of evening school is the Continuation School. According to the code of 1905, the subjects in this grade of school are grouped as follows:—

1. *Preparatory and General*—Reading, composition, writing, arithmetic, knowledge of common things, elementary principles of science, elementary drawing, elementary science, theory of music and vocal music. ^{Groups of subjects of Continuation Schools.}

2. *Literary and Commercial*—English, Latin, French, German, any other modern language, mercantile law and practice, commercial correspondence and office routine, bookkeeping and shorthand.

3. *Manual Instruction*—Woodwork and metal work.

4. *Science*—Any generalized or special branch of science, including mathematics, is accepted as adequate.

5. *Home Occupations and Industries*—Needle-work, domestic economy, cookery, dressmaking and cutting out, laundry work, dairy work, gardening, cottage industries, ambulance, home-nursing.

6. *Physical Training*.

7. *Art*.

Flexibility of
system.

Other subjects may be recognized at the discretion of the Board. Each school must provide for at least two subjects, but only one is compulsory on each pupil. The system is intended to be a flexible one, and it is so working out. In the rural districts dairying and farming are taken up as well as the regular elementary subjects; in industrial centres the course supplements the practical work of the apprentice; and elsewhere the work is more like that of an ordinary secondary school. In an effort to meet the wants of the rural districts, here and there Travelling Schools have been provided. In Hampshire, for example, the Education Committee maintains a Dairy School and a Travelling Forge, which travel for 40 weeks, giving a ten days' course in each locality. In the rural districts, little support is given to the ordinary continuation schools. The travelling schools, on the other hand, are very popular.

Travelling
Schools.

Evening
Technical
Classes.

As to the technical classes: In England the working-week of the apprentice in most trades is about fifty-four hours, and, to enable him to attend the evening schools, the local education authorities endeavour to secure at least his exemption from overtime work. During the last few years these efforts have been remarkably successful, especially in the North of England; and in many cases, as the result of conferences between the school authorities and the employers, the latter have provided even additional inducements. The pupils attend three evenings a week, receiving a total of six or seven hours of instruction; but in every case where satisfactory results are obtained, they devote one other evening a week to private study.

Organization
Courses.

Courses are so arranged in most of the progressive towns that pupils who have done well in the elementary schools and who have attended the ensuing session of the evening continuation school, begin with the first year of a two years' industrial course. In that year they usually receive four hours' instruction in practical arithmetic and mensuration, and free-hand and mechanical drawing, with

two hours a week in English (chiefly composition). In the next year they give a little less time to English and about two and a half hours to elementary practical physics and mechanics. In the third year they continue their practical mathematics, and give about two and a half hours to theoretical and applied mechanics, and about two hours to machine construction and drawing, including free-hand drawing. The courses extend over five years or more, and become more specialized toward the close. Under this scheme, the artisan student is required generally to take the first two years' industrial course prescribed above; in the third year, the mechanical and electrical engineers take slightly different work and in the fifth and higher years, each student specializes in the particular branch of the trade in which he is engaged.

The technical evening classes, of varying character and standard, are the most important general provision that now exists in England for the education of the skilled mechanic. As has already been stated, England realized late the value of a State controlled system, and notwithstanding the very remarkable progress of the last ten years, she has not yet organized a satisfactory one. Her evening technical schools are, as yet, her main reliance. Their importance.

No effort is spared by the Education Committees to secure attendance at the evening technical schools. When I reached London early in September, the evening schools had not opened, but I found that their programmes and advantages were widely advertised not only in the newspapers but in large posters extensively distributed throughout the city. Later I found that lists of pupils are sent from the elementary day schools to the teachers of the evening schools, who send prospectuses and letters of invitation to those who would probably attend. To aid in the work, the day teachers take part in the evening classes, and their knowledge of the day school records is of great value in stimulating the attendance. Prizes and scholarships are also offered. Efforts to secure attendance.

The Board of Education secures, through its inspectors, a voice in the organization of the Schools. These officers keep in close touch with employers of labour and familiarize themselves with industrial conditions and are, accordingly, of great service to the local school authorities. Departmental Direction.

III. MANAGEMENT, FEES, AND TEACHERS

The day and evening technical classes are generally in the hands of a principal, acting under the control of the local education committee. The co-operation of employers is often secured by the formation of Advisory Committees, representing the chief manufacturing interests, and, to aid the movement, some of the employ- Advisory Committees.

ers give specially favourable terms to the pupils who pass through such schools.

**Fees and
Scholarships.**

The fee for the session is generally small, running from 75c. to \$2.00, and being often proportioned to the weekly wage of the parent; and it is generally remitted in the case of needy pupils. Lunches are often provided at a very small cost. Scholarships, covering free tuition, are granted pupils of the elementary schools as the result of examination tests. Here and there throughout my report I mention the fee in order to give a better idea of the situation. Universally I found the imposition of the fee advocated on the ground that it causes the student to set a higher value on the instruction and, in particular, to attend more regularly.

**Qualification
of teachers.**

So far as the instructors of the technical day and evening schools are concerned, the ordinary English, mathematical, and science subjects are taken by competent certified teachers who are expected to have a knowledge of the industries concerned, in order that they may be able to give a practical application to the academic work. The frequent absence of this knowledge is, admittedly, one of the worst defects of the system. The purely technical subjects are taken by teachers who possess practical familiarity with the work, such as is possessed by foremen in first-rate establishments; a good knowledge of the theoretical side of the subject, and pedagogical ability. Generally speaking, the teachers of the ordinary subjects in the evening classes are also teachers in the day schools, while the teachers of the evening technical subjects teach either part or whole time in the day schools, being engaged in their vocation during the rest of the time. As I found to be the case in the other countries I visited, competent teachers are scarce, and a satisfactory solution of the serious problem of providing a sufficient supply has not yet been reached.

**Attitude of
Organized
Labour.**

When Trade Schools were first established, the attitude of the Labour Unions was unfriendly; but, as their value was demonstrated, the Unions withdrew their opposition. In some localities, indeed, they are so friendly that they even assist the students by offering prizes and scholarships and by paying their fees.

SCHOOL EXPENDITURE

When at Whitehall I asked for a statement showing the expenditure from Imperial and local sources, respectively, for the different classes of Technical Schools. I found that, in the case of institutions other than the Public Elementary Schools, the number of different kinds and the differences among them from the point of view of fees, endowments, etc., are so great that, to be reliable,

the statement would have to go into very great detail and to be full of reservations. I am able, however, to give the expenditure for elementary education, which shows, what appears to be generally true of all the educational expenditures, that the Imperial grant is at least equal to the local rates. In 1908-09 the total expenditure of the Board of Education for Public Elementary Education in England and Wales alone was \$54,382,396.00, and for other departments, including science and art, \$6,097,627.00; while the local rates were respectively \$47,880,890.00, and \$7,140,772.00; that is, for the maintenance of the foregoing classes of schools \$60,480,023.00 was contributed by the Imperial Government and \$55,021,662.00 by the different municipalities.

COMPULSORY ATTENDANCE OF ADOLESCENTS

One of the greatest difficulties of the English Board of Education is the inability of the local Education Committees to secure attendance at school after the pupil has completed, at about 12 years of age, the obligatory course of the elementary school. By means of scholarships, remission of fees, and other financial aid, the child of more than average ability may, and often does, advance beyond this stage, even to graduation at one of the universities or higher technical institutions; but the child of average intelligence, whose parents belong to the artisan or the labouring classes very often loses in a few years much of the education he has received and drifts into the ranks of the unemployed or of unskilled labour. Speaking generally, indeed, the classes from which, at present, the ranks of the ordinary skilled artisans are recruited in England consist of boys and girls who, after leaving the Public Elementary School,—

Efforts to secure attendance after the obligatory course.

Sources of skilled artisans.

1. Enter work-shops and factories and are put to work at one part of the process, or at one machine, in the use of which they become fairly skilled in a short time, such workers seldom obtaining any complete knowledge of their trade; or—

2. Either enter unskilled employments, or spend their time in workshops in doing unskilled work as messengers, etc., and finally become apprentices at the age of 16.

As I will point out later, the problem of providing for boys and girls immediately after they leave the elementary school has been solved in Scotland, Germany and Switzerland by compulsory attendance. In England, however, so far no practicable solution has yet been reached. But a solution has been proposed, which there can be little doubt, will eventually be accepted, probably, of course, with modifications. In April, 1907, the Consultative Committee, a body of eminent educationists nominated by the Board

How to secure attendance: Report of English Consultative Committee.

of Education, was requested to report upon the best means of securing at the evening Continuation Schools a larger attendance of pupils who have left the Public Elementary Schools, as well as the best means of securing the effective co-operation of employers and others able to give help, in arranging facilities for such attendance and in planning suitable courses and subjects for such classes. The Committee's report had been published a few weeks when I reached London. Having regard to the situation in Ontario, which I will discuss later, I give a concise statement of the parts of the Committee's recommendations which bear directly on the provisions for an effective system of vocational training:

Exemption,
when per-
mitted.

1. Exemption from full time attendance at the Day School in the case of boys and girls under 16, should be allowed only when the parents or guardians can show that such children are suitably employed, and while they continue so employed.

The teachers.

2.—(1) As regards teachers, it will be desirable to interest the Day School teachers in the work of the Continuation School, and it will often be necessary to employ them in giving instruction there. Care must be taken to prevent overstrain in the case of teachers who teach in both Day and Evening Schools.

(2) Classes should be established in which persons who are already teachers should be trained in the more specialized parts of the work of the Continuation School, and in which experts in such subjects may be trained in the art of teaching.

Other means
of increasing
efficiency and
securing
attendance.

3. Apart from the better preparation both of the pupils and of the teachers for the Continuation School, much may be done to enhance the efficiency of these Schools and to enforce the attendance thereat, upon the present voluntary basis, as follows:

(1) Effective encouragement from employers of labour;

(2) Systematic visitation of the parents of children who are about to leave the Day School;

(3) The personal influence of the Day School teachers;

(4) Propaganda amongst work people;

(5) Close co-operation on the part of local school authorities with voluntary agencies;

(6) The better adjustment of the courses of instruction to the needs of local industries;

(7) The provision of systematic classes in history, literature, and economics for adult students.

Boys and girls should be induced to attend the Continuation Classes as well during the last months of their Day School course, due precautions being taken against overstrain.

Compulsory
attendance
till 17 at
Continuation
Schools.

Although much may be achieved without legislative enactment, the Committee reports that without compulsory attendance at the Continuation Schools, large numbers will remain without the education they sorely need. The following sections explain the way in which the Committee thinks such attendance should be enforced:

1. It should be the statutory duty of the Local Education Committees ^{Powers of Local Education Committee.} to make suitable provision in their districts for Continuation Classes from the time the pupils leave the Day School until their 17th birthday, and to keep a register of all such young persons, with a record of their occupations.

2. It should be lawful for the Local Education Committee to make by-laws (subject to confirmation by the Board of Education) for requiring attendance at the Continuation Classes to an age fixed by the by-laws, but not exceeding 17, of any young persons resident or working in their district who are not otherwise receiving a suitable education. It should be left to the discretion of the Local Education Committee:

(1) To frame by-laws for one or both sexes, for part or parts of its district, and for those engaged in particular trades or occupations therein; and

(2) To determine the age or ages under which the bye-law shall be operative within the limit of 17 years of age.

3.—(1) It should be the statutory duty of every employer of any young person under 17 years of age—

(a) To enable him to attend the Continuation Class provided for in (1) above; and

(b) To supply the names of such young persons to the Local Education Committee on demand.

(2) Employers should be forbidden under penalty to employ or to continue to employ any young person under 17 who failed periodically to produce a card attesting his or her attendance at a Continuation Class.

4.—(1) The Local Education Committee should have statutory power, after consultation with representatives of the employers and of the work people in each trade, to fix the hours and seasons at which the compulsory Continuation Class should be held.

(2) The Committee should also have the power to prescribe the limit of hours which may not be exceeded on any day or week, as the case may be, by employment and further education combined. Such restriction should be adjusted to the different conditions of the various trades and callings concerned.

5. As regards curriculum, the Continuation School should give effective ^{Curriculum.} training for the duties of citizenship, and should have reference to the crafts and industries practised in the districts, including industrial art and agriculture, when the latter is practised. Prominence should be given to practical and manual instruction in the courses, but the claims of general education should not be disregarded. On every ground, the courses should include physical training.

6. For the planning of courses of instruction and for their periodical adjustment, the local committees should establish advisory committees, containing representatives of the employers and work people in each calling and of persons experienced in teaching.

It is also proposed, I may add, to raise to 13 the minimum age ^{Increase of minimum age.} for school exemption, which is now 12, and, after a short interval, to 14, provided, however, that in country districts the last year of schooling may take half time from 13 to 15, instead of whole time from 13 to 14.

CITIES VISITED

In England I investigated the technical school systems of London, Manchester, and Liverpool—of London, because, besides its higher technical institutions, it has the best developed system of Trade Schools; and of Manchester and Liverpool, on account partly of their Municipal Technical Schools and partly of their provision for technical education intermediate between the elementary schools and the higher institutions.

LONDON

Local control. Practically all elementary education in London is under the control of the London County Council, London being a county for administrative purposes. In the case of higher education, the Council is associated with several other authorities, such as the University of London, the City Companies, the governing bodies of endowed Secondary Schools, polytechnics and technical institutes. The object is, by co-operation, to prevent overlapping.

HIGHER ELEMENTARY SCHOOLS

Attendance. In London, with a population of nearly 7,500,000, the Higher Elementary Schools—52 in number in 1908, with about 27,500 pupils—provide at suitable centres a superior day school elementary course. The pupils are selected from the elementary schools on the combined report of the Council's District Inspectors and the Head Masters and Head Mistresses, who take into account not only the ordinary examination results, but the pupil's school record and general capability. In these schools pupils enter at the average age of eleven and a half, and are provided with a three or four years' course which is industrial, commercial, or general, according to the varying requirements of the different localities. But the purpose and character of these schools are at present under the consideration of the Council and it is probable that changes will be made with a view to a more practical character of work and better articulation with the rest of the system.

Admission tests

Courses to be modified.

TECHNICAL SCHOOLS

But the advantages of the Higher Elementary Schools are not available to all, nor are they available long enough to any to prevent the boy or girl of normal intelligence from drifting into the ranks of unskilled labour at fourteen. The decay of the apprenticeship system has, of course, intensified the difficulty of the situation. The London County Council is now attempting to solve the problem by means of its system of day and evening Trade Schools.

The day work of these institutions covers a wide field and includes drawing classes for designers, teachers, and skilled craftsmen; pre-apprenticeship classes for boys entering such trades as engineering, building, silversmithing, and cabinet-making; trade classes for girls in dressmaking, waistcoat making, upholstery, corset-making, millinery, ladies' tailoring, and photography; and domestic science classes for girls; but the great majority of the students at present attend the evening classes, being engaged during the day in commercial or industrial pursuits. The number of day students is, however, steadily increasing. Of these, some are preparing to take up industrial work or are already so engaged and attend with the permission of their employers.

Day and Evening Trade Schools.

The trade schools have of late years become very popular and have increased in numbers. The employers are also realizing the value of the instruction given in them, and, as a result, there is no difficulty in providing employment for those who have taken a full course of training. Moreover, it is found that in periods of trade depression, the more skilled artisans from the trade schools retain their positions when others are dispensed with. A reliable authority on this subject told me that these satisfactory results are due in a great measure to the continuance of the pupils' general education and to the fact that, while trade instruction is imparted by fully trained experts, a large share of the time-table is devoted to drawing. The consequent intelligence and originality of the trade school pupils side by side with their manual dexterity is greatly appreciated by the employers.

Value recognized.

A very important development in connection with the trade schools is the establishment of Voluntary After-care Committees, the members of which interest themselves in the pupils both while they are in attendance and especially after they have been successfully placed in work-shops. These committees obtain information as to the condition of workers in the various shops, give assistance to those who are seeking employment, and, whenever periods of apprenticeships are arranged, they take care that the interests of the boys and girls are carefully safe-guarded in the indentures.

Voluntary After-care Committees.

Higher technical instruction is provided for those who can avail themselves of it at the Imperial College of Science and Technology, at University College, King's College, and other institutions of University rank; and a good deal of the technical instruction, especially in the form of evening classes, is carried on in Polytechnics and other Technical institutions. Of these, some are aided by the London County Council and others are wholly maintained by it, while some receive no aid from this source.

Higher Technical Institutions.

Institutions
aided or
maintained
by the Council.

The institutions aided by the Council are attended by over 30,000 students, and include the Polytechnics, the Goldsmiths' College, the Hackney Institute, a number of Art Schools, and Monotechnic Institutes, as well as a group of institutions, such as the Workmen's College, which, however, deals more with general culture than with technical subjects. Each of the institutions aided by the Council is managed by a governing body on which the Council is represented. The rest of the cost of maintenance is defrayed by grants from the Board of Education, the Parochial Fund, endowments, students' fees, and voluntary subscriptions. There are fifteen institutions under the control of the Council, and in their case the difference between the cost of maintenance and income from the government grants and the fees is made good from the rates. Some of the most important and suggestive of these I describe further on.

Fees.

The fees for admission to the London County Council Schools are small. The general fee is about \$7.00 a session. In a few cases it is a little larger. No charge is made for materials except for those taken away by the pupils as finished work. To the schools maintained by the Council, apprentices, improvers, and learners under twenty-one are admitted free. Moreover, the Council awards annually a large number of scholarships and exhibitions, varying in value from \$25 to \$250, and tenable at the various Polytechnics and other Technical Schools.

Schools not
controlled
by Council.

Of the schools receiving no aid from the County Council, the most important is the City and Guilds Finsbury Technical Institute, which provides a two years' course for the mechanical and electrical engineering trades, and a three years' one for those entering the chemical trades. Other schools of this class are the Great Titchfield Street Trades Training School, the Leather Trade School, and the South London Technical Art School.

Management:
Advisory
Committees.

As to management: The powers and duties of the Education Committee of the County Council are distributed among eleven sub-committees; and, in the management of its Technical Institutions and Schools of Art, the Committee is assisted by Advisory Sub-Committees and Consultative Committees of trade experts, who advise it on matters connected with the administration of the work of their respective industries.

ELEMENTARY EVENING SCHOOLS

In addition to the day and evening classes of the Polytechnics and other technical institutions, there are in London, according to the report of 1908, 302 evening schools carried on in the buildings of the Council's Elementary Schools and attended by about

130,000 pupils. The courses vary greatly in character and are provided in two grades—ordinary evening classes, and higher grade science, art, and commercial classes. Two grades of Schools.

In the ordinary evening classes the instruction is intended partly to supply the defects of early elementary education and partly to prepare for the higher grade. Ordinary. The principal subjects of instruction are shorthand, reading, writing, arithmetic, gymnastics, and subjects with a practical and industrial outlook, such as dressmaking, book-keeping, manual training, first aid, home nursing, French, cooking, and millinery. At the higher grade centres Higher. most of the students take the commercial classes in which instruction is given in shorthand, book-keeping, typewriting, English, French, German, with more advanced classes in accountancy, banking and currency, commercial and municipal law, machinery of business, Spanish, Italian, Russian, and Esperanto. In Science, instruction is given in chemistry, machine drawing, mathematics, and physiology; and in Art, chiefly in light and shade, model, free-hand, blackboard, and perspective drawing.

The ordinary schools are open generally three evenings a week from 7.30 to 9.30, and the central schools on four evenings a week for about two and a half hours each evening.

The fees, which cover all the subjects of instruction, are very Fees. low, being 25cts. a session for the ordinary classes; 60cts. for the commercial centres, and \$1.25 for the science and art subjects. Of the 302 evening schools, there are about 70 free schools in the poorer districts, and the pupils in these districts who are unable to pay the fee may be admitted free to the other evening schools.

The evening schools and the special technical evening institutes are the most popular and noteworthy feature of the English educational system, and, owing to local conditions, they are most fully developed in London.

SCHOLARSHIP SYSTEM

A feature of London education is its scholarship system, a Importance. feature, however, which has been adopted in some of the other large cities of England as well. This feature deserves more than passing notice, for it exemplifies, strikingly, municipal liberality as well as the difficulties connected with the maintenance of day trade schools; and, although our conditions do not now necessitate such a system in its entirety, it presents some features that are well worth our imitation.

Of the scholarships, there are two classes; the County Two classes of Scholarships. Scholarships, and the Technical, Industrial, and other Scholarships. The former provides a scheme of Junior. Intermediate.

and Senior Scholarships under which a boy or girl may proceed, step by step, without fee, from the Public Elementary School to a University Technical College or other institution of advanced learning. At the age of eleven, every pupil in the Elementary Schools, who has reached a certain standard, is required to take an examination in English and arithmetic. On the result of this, combined with the teachers' estimate, the Junior County Scholarships are awarded. On certain conditions as to the means of their parents, pupils not in attendance may also compete. The scholarships are tenable for three years, and are renewable on recommendation for two more. As a rule, they are held until the pupil is sixteen. Some pupils then leave for industrial or other pursuits, and others obtain Intermediate Scholarships which enable them to continue their education at school until they are eighteen or nineteen, when they may apply for Senior Scholarships which enable them to proceed to a University or Technical School. The Intermediate and the Senior Scholarships are also open, under conditions, to those who have not held the Junior grade. The Technical and Industrial Scholarships are intended to assist students to prepare themselves for some particular trade or vocation.

Trade School Scholarships.

At present, Trade Scholarships for boys are awarded for courses in engineering, silver-smithing, book-binding, furniture and cabinet making, carriage building, wood carving, and house building; and for girls, in dressmaking, laundry work, upholstery, tailoring, waistcoat making, corset making, millinery, designing, ready-made clothing, and photography.

Maintenance allowances.

Notwithstanding this scholarship system, the child of poor parents is unable to attend for two or three years' continuous instruction after he has reached the age of fourteen, unless some provision is made which will recoup his parents for the loss they sustain by not letting him enter some unskilled employment. For this purpose, the County Council has provided a system of maintenance allowances. In the Shoreditch Technical School, for example, a maintenance allowance is made to boys of \$30 for the first year, \$50 for the second, and \$75 for the third. As a rule, the Trade School Scholarships for girls are for a period of two years, with a maintenance allowance of \$40 for the first year, and \$60 for the second year.

Eligible candidates.

In order to make certain that trade scholarships shall be given only to children who really need assistance, no candidate is eligible whose parents or guardians have an income of over \$800 a year from all sources. Moreover, to prevent the funds from being wasted, the awards are conditional on the candidate's passing satisfactorily a probationary period of three months at the

trade school with no payment for maintenance, but simply with free tuition. At the end of this period his right to the scholarship ceases if an unsatisfactory report is received. The parents or guardians are also required to sign a declaration that they intend their children to enter the trade in which they are to receive training during the tenure of the scholarship. According to the reports of those who are engaged in the work, these safe-guards work very satisfactorily, and a large percentage of the scholarship pupils eventually find employment in the trades which they have taken up in the schools.

The gross cost of the County Scholarship Scheme was, in 1908, about \$750,000. Of this sum \$435,000 represents education and \$315,000 maintenance allowances. Hitherto, no one able to qualify has been refused a scholarship, and it has been estimated by the Chief Adviser of the London County Council that when the scheme has reached a fairly steady condition the annual expenditure on this account will reach \$1,250,000.

Cost of
Scholarship
Scheme.

COUNTY COUNCIL SCHOOLS

Of the institutions maintained by the London County Council there are fifteen of the trade school type, attended by nearly 10,000 day and evening pupils; only one of these, however—the Bloomsbury Day Trade School for Girls—being for girls alone. As characteristic examples of the institutions maintained by the Council, wholly or partly, I have selected the following:

1. The Central School of Arts and Crafts.
2. The Shoreditch Technical Institute.
3. The Monotechnic School of Building at Brixton.
4. The Borough Polytechnic Institute.

CENTRAL SCHOOL OF ARTS AND CRAFTS

GENERAL

In the management of its different trade schools, the Educational Committee of the Council, as has already been stated, is assisted by Consultative, or Advisory, Committees. The Consultative Committee of the Central School of Arts and Crafts on Book Production may be taken as a type. It is constituted as follows, there being three representatives in each case (nine members for each section):

Consultative
Committee.

1. *Book-binding Section.*—Representatives of the London Book-binders' Association, of the Workmen's Associations (Consolidated Society, Day-working Book-binders, Consolidated Unions), and of the Council.

2. *Printing Section.* — Representatives of the Associations of Master Printers, of the Federation of Printing and allied trades, and of the Council.

Aim. The school is intended to supplement rather than supersede, apprenticeship, by affording to those engaged in the typical London art industries opportunities for design and practice in the branches of their craft which, owing to sub-division of processes of production, they are unable to learn in the workshop. The building, class-rooms and equipment are amongst the finest I saw in London. The display of the work of former sessions was most artistic.

The fees are as follows:

Fees. 1. Apprentices, learners and improvers under 21 years of age are admitted free on production of certificates from their employers or on showing copies of indentures.

2. Persons employed in trades or occupations upon which the teaching of the school has a distinct bearing are admitted to all or any of the evening classes of the school which they are eligible to join on payment of fees at the following rates:

(1) If earning over \$6.00 a week, \$2.50 a session.

(2) If earning \$6.00 or less a week, \$1.00 a session.

3. Persons not so employed may be admitted to the school on payment of \$2.50 a term or \$5.00 the session; but pupils below the age of 16 years, on furnishing satisfactory evidence that their work is of sufficient merit, may be admitted on payment of \$1.00 for the session.

Disposal of products.

No work may be taken from the institution until it has first been submitted to the Principal for inspection and approval. Work executed in materials provided by the Council becomes the property of the Council; but pupils who desire to possess their work can, as a rule, do so on payment of the cost of material used.

EVENING TRADE CLASSES

Admission to Trade Classes.

In the practical trade classes, admission is given only to those engaged in the trade. These classes are intended to supplement workshop practice, and not to teach trades. Pupils are expected to attend lectures and to work in connection therewith, and those who fail to do so are not allowed to continue the workshop practice.

Additions to the ordinary courses.

Free tickets of admission to the Victoria and Albert Museum and Library, etc., are obtained for all pupils who require them. During the session arrangements are made for certain of the classes to visit the Victoria and Albert Museum, South Kensington, under the guidance of their respective teachers. It is intended that the best examples of craftsmanship shall be examined with the view of preparing a scheme of work for the following session. Pupils are required to take note-books on their visits.

A course of lectures on various subjects connected with artistic crafts is delivered during the winter months. Admission is free and pupils and their friends are invited to attend.

The courses of instruction are in eight groups, as follows, the classes for each group being accommodated on a single floor:

1. *In Architecture and the Building Crafts.*—Design, lectures Groups of courses. on history of architecture, building construction and structural mechanics. Practical courses in stone and wood carving and lettering, lead work, decorative plaster work, iron work, bronze casting, etc., are associated with this section and with the Modelling School.

2. *In Silversmiths' Work and Allied Crafts.*—Silversmithing, large and small, goldsmiths' and jewellers' work, diamond mounting, art metal work, chasing, repoussé work, engraving, die-sinking, design, modelling, metal casting, enamelling and (later) electro-deposition and gem cutting.

3. *In Book Production.*—Book-binding, typography, black and white illustration, writing and illumination, lithography, woodcuts and wood engraving, miniature painting, etching and mezzotint, and lectures are given with a view to bringing into closer relationship the various branches engaged in book production.

4. *In Cabinet Work and Furniture.*—Cabinet work, inlaying and marquetry, polishing, upholstery, wood carving, and gilding; also design for furniture, workshop drawing, workshop arithmetic, perspective and interiors.

5. *In Drawing, Design, and Modelling.*—Drawing from Life. This group is in close relation to all the other groups.

6. *In Needlework.*—Dressmaking, embroidery, etc. Tapestry and silk weaving are to be added as soon as required.

7. *In Stained Glass Work, Mosaic, and Decorative Painting.*—The general composition and setting out of windows; ornament, as applied to glass, cutting and leading, painting in tempera.

8. *Art.*—The Royal Female School of Art, established at Bloomsbury, is now under the control of the Council, and has been incorporated in the Central School.

As examples of the various curricula for the different Evening Examples of curricula of Evening Trade Schools. Schools, I have selected those of the School of Architecture and Building Crafts, and the School of Book Production:

SCHOOL OF ARCHITECTURE AND BUILDING CRAFTS

Architectural Design: A variety of subjects is given at the commencement of each session, from which the pupil selects, according to his experience or capacity, such as he desires to work out. Individual instruction is given from the point of view that architecture should take its form

in response to present requirements and materials grounded on the past experience of building processes, the solution of the given problems being affected by considerations of æsthetic selection.

A course of lectures on the "General History of Architecture," is given. Advanced pupils are required to attend these, and also such additional lectures as may be given during the course of the session.

The instruction in architectural drawing comprises the copying of historical examples, preparing details from small scale drawings, colouring and lettering plans, also the elementary laws of perspective, etc.

Groups are formed for study of the following subjects if a sufficient number of applications are received:—

(a) Applied Geometry and Working Drawings; (b) Vaulting; (c) Lettering; (d) Materials; (e) Sanitation; (f) Specifications and Estimating; (g) Construction, Shoring and Underpinning; (h) London Building Acts.

Arrangements are made for visits to works in progress.

A library of architectural works for loan and reference is being formed, as well as a museum for specimens and models.

Drawing boards and T. squares are provided, but pupils must bring their own drawing instruments, set squares, note and sketch books, paper and other materials.

Building Construction: A course of instruction is given with direct reference to the work of the architectural class, illustrated by models, specimens and occasional visits to buildings in course of erection.

(1) Junior Course (once a week).—Excavation (necessity of foundations, usual methods of forming same, concrete for trenches and basements). Brickwork (principal bonds, footings, walls, piers, arches, damp-proof courses, parapets and copings). Masonry (stones in general use, methods of building stone walls, of jointing and of arching). Carpentry (use of timber in floors, roofs, partitions and beams, jointing and fixing of same). Slating and tiling (general description of slates and tiles, with consideration of relative advantages, gauge, lap and bond, labours at ridges, hips, verges, eaves, etc. Joinery (floor covering, methods of jointing, door and window frames). Ironmongery (door furniture and locks, sash and casement fastenings, hinges). Plumbing (zinc, lead and copper roofings, gutters, flashings, rolls, hips and valleys). Iron work. (Built-up plate and box girders, iron roofs to 40 ft. span). Plastering (rendering, floating and setting, coarse stuff, putty, rough cast cornices).

(2) Senior Course (once a week).—Excavation (various soils and the different methods of forming foundations in the same). Concrete (various kinds of concrete and their use in foundations, floors, roofs, partitions, etc. The manufacture and properties of lime and cement). Brickwork (special bonds, chimney construction, building by-laws and thickness of walls, the manufacture and use of bricks, terra-cotta and tiles, mortar). Masonry (various kinds of granites, sandstones, limestones, marbles and slates in general use and their application). Iron work (roof trusses, girders, re-inforced concrete, the properties of cast and wrought iron and steel). Carpentry and joinery (roofs, floors, staircases, French casements, skylights, dormers, counters). Sanitary work (principles of simple domestic drainage, water service and ventilation). Lighting (notes on gas and electric lighting). Materials (brief description of the principal materials in use on or in buildings, including uralite, vulcanite, rubberoid, patent partition blocks, etc.).

Pupils of both classes are expected to attend at least one Saturday visit in each term.

Pupils of the Senior class may attend the Junior class in addition, if they so desire, and vice-versa.

Structural Mechanics: The course includes the determination of the stresses in roof principals and girders due to loading and wind-pressure and the application of iron and steel to building purposes. The determina-

tion of forces arising in and the stability of columns, arches, domes, etc., and the stability of buttresses, retaining walls and foundations.

A course of experimental instruction is also included, in which experiments are performed by pupils upon suitable models and apparatus to determine the stresses and deflections in beams, columns, roof principals, shoring, etc., and the stability of buttresses, retaining walls, arches and domes.

The lectures deal with practical design and calculations with special reference to the work of the Architectural class, and without the use of higher mathematics and examples of construction will be worked out.

Shaded Drawing (mostly from the round): The course is intended for architects and others engaged in design, and is open to elementary pupils.

Drawing boards are provided, but pupils must provide their own drawing materials.

Lettering and Inscriptions: A course is given, adapted to the requirements of monument masons and letter cutters, and also of architects and sculptors. It is intended to carry on in stone the more general teaching of the writing and lettering classes with a view to raising the quality of the lettering carved on public buildings.

The instruction given is of a practical nature and includes the carving of the Roman Alphabet, incised and in relief, also the Roman small letters or lower case and italics, and other more specifically ornamental forms suitable for special purposes. The basis of the instruction is the Roman Alphabet.

Materials and apparatus are supplied by the Council, but pupils must use their own tools.

Instruction may also be provided in general stone-working, including the various kinds of stone and methods of working them, such as reducing blocks to working sizes, squaring up, hammer and point, mallet and tools, axed work, working from templates, circular work, simple development of mouldings and capitals, working and polishing of marble and other branches of stone work.

Woodcarving: The carving of picture frames and other simple objects is taken up.

Ornamental Lead-work: The course includes casting, and supplements the Sanitary Plumbing taught in other classes, thus providing for all that is usually described as "external plumbing." The laying of lead on roofs as practised now and in former times is compared and discussed, having regard both to material and workmanship. The various ways of ornamenting lead and the use of lead for ornamental purposes are taken up in detail, and the methods, so far as is possible, practised in the workshop, as follows:—

Sheet-lead Casting (a casting table, 6 ft. by 3 ft., is provided for this): Simple Casting in sand (with open moulds) and generally the art of moulding in sand. Pattern-making, especially the use of leads for patterns. The simpler alloys of lead; metals added in order to toughen or harden lead or to prevent shrinkage in casting. Beaten-up work, with and without a wood or other hard core. Cast Sheet versus Milled Sheet for beaten-up work, also with especial reference to the expansion and contraction of lead under changes of temperature. Pierced Lead Work; Incising, Stamping, Punching and Inlaying Lead. Tinning used ornamentally on lead. Painting and Gilding.

Some of the objects to which the above processes in ornamental lead-work are applicable and in the design and making of which practice is afforded to pupils are:—Ridges and Finials, Gutters, Pipe-heads, and Cisterns, Crestings, Vallances, Tablets for inscriptions, Flower Boxes, etc.

Iron Work: The course includes drawing and design, and is suitable for smiths desirous of studying decorative metal work. Furniture designers and

architects are also advised to study this subject in relation to their work; handles, hinges, lock plates, keys, finials, etc., being separately studied.

Bronze Casting: A short course is provided of demonstrations in bronze casting, of interest to modellers, architects, and metal workers generally.

SCHOOL OF BOOK PRODUCTION

Bookbinding: The course is confined to journeymen and apprentices. The workshops are fitted with all necessary appliances for forwarding and finishing. Pupils are encouraged to carry out, from first to last, the binding and decoration of books, and to design and work out their own patterns.

The method of teaching adopted is founded on the almost imperishable character of the work of the early bookbinders, and greater stress is laid on sound principles of construction than on high finish.

Instruction is given in forwarding, collating, pulling, sewing, glueing up, rounding, backing, adjusting boards, cutting, edge gilding, headbanding and covering, finishing; designing, blind tooling, gold tooling, the treatment of end papers and polishing.

Instruction in washing and mending and in vellum and account book work is also arranged for.

Typography: The course aims at supplying instruction in the highest type of book work as distinct from advertising matter, trade cards, etc. Work is done in co-operation with the classes in bookbinding, lettering, black and white design, etc., with a view to form a complete school of book production.

Paper and Leather: Courses of lectures are given by experts in the use of paper and leather.

Book Illustration: The course of instruction deals with space fillings with single figures, decorative borders, headings, and tailpieces, title pages, initial letters and all other branches of book illustration and decoration. The best examples of black and white work are available for study, and special attention is also paid to the adaptations of method called for by the requirements of process reproduction. Advanced pupils are enabled to study from the draped living model.

Day classes are also conducted twice a week, from 10 to 1 and 2.30 to 5, when pupils who desire to work in colour or black and white receive every assistance. Outdoor work is also a special feature of this class.

Writing and Ornamentation: Courses suitable for addresses and other MSS. are taken up under this head.

The development of the Roman Alphabet by the use of certain tools and the modifications of its forms by the commonest—the pen—provide the study for this class; illustrations being drawn from the varieties of several centuries, chiefly the “Anglo-Irish,” early “Gothic” and “Italian Renaissance” hands. The forms, proportions and characteristics of the “Roman,” “Uncial,” “Half-Uncial” and “Versal” alphabets are examined in particular and compared with notes and explanations as to the requisites of legible, beautiful lettering.

All pupils are advised to learn and practise a “formal” or book hand, the round writing of the eighth, the more angular hand of the tenth centuries or an Italic hand being recommended. Certain principles of lettering and the character of pen work are readily appreciable by such practice.

The application of lettering for common purposes, as in title pages, notices, etc., is considered, and special attention given to the requirements of documents, addresses and above all, the book—as setting a traditional and conventional standard in such matters as the proportion of margin to text, size and combination of letters, spacing of lines, paragraphing and other details of general arrangement.

The historical importance of the initial letter is insisted upon, and the consequent growth of ornament therefrom, the introduction of subordinate ornament, line terminals and other decorative devices, following in order, according to the capacity of the pupil and the time available.

Instruction is given in the use of raised gilding, and the colours and materials generally to be employed.

Day classes are also held twice a week, from 2 to 4.30 p.m.

Lithography: The course is intended primarily for those who are engaged as lithographic draughtsmen or designers, but it is also open to artists who desire the ability to translate their work into this medium.

The class room is fitted with all the necessary requirements for drawing and a fully equipped press for afterwards proving the stones. Pupils provide their own drawing materials, but the School provides the stones and, subject to the approval of the teacher, any pupil may have a reasonable number of copies of his work when completed. Pupils may, if they wish, attend for practice on other evenings.

The course includes: Drawing on polished stone—pen work. Drawing on grained stone—chalk work. Drawing on transfer paper, grained paper, etc. Drawing on zinc and aluminium. Lithography in colour. The class meets once a week, from 2 p.m. to 4.30 p.m., and on two evenings.

Wood Cuts in Colour and Wood Engraving: The course consists of twelve demonstrations in Wood Engraving, including the Design, Engraving and Printing of Colour Prints from Wood Blocks by a method based on the Japanese practice.

Etching and Mezzotint: Practical instruction is given in etching, aquatint, line engraving, mezzotint, relief engraving, steel facing and plate printing. A day class is also held once a week, from 2 to 4.30 p.m., in addition to two evenings.

Miniature Painting: Besides the ordinary course, facilities are given to advanced pupils for study from the living model in miniature painting.

PREPARATORY DAY TECHNICAL SCHOOLS FOR BOYS

I. THE SILVERSMITHS' AND ALLIED TRADES

This school was established with the object of providing ^{Aim.} technical instruction for boys who propose to enter some branches of the trades dealing with the precious metals. Here also there is a special consultative committee of trade experts.

As indicative of the general character of the London Trades Schools, the statement of the aim of the School, as set forth in its prospectus, is well worth quoting:

The object of the school is to enable boys who intend to enter some branch of the silversmiths' trade or kindred crafts, as silversmiths, goldsmiths, jewellers, chasers, engravers, piercers, carvers, mounters or draughtsmen, to continue their general education and at the same time to acquire such a knowledge of the artistic principles of design and of the scientific principles of construction, of the properties of materials and of the use of tools, as will enable them at the end of a two or three years' course to enter a workshop with a full appreciation of the points to which they are expected to direct their attention, and with an intelligence so trained as to make them immediately of substantial value to an employer. Moreover, a boy who has passed through the school, though he may be required to devote himself for years to some special operation in the workshop, would be able readily to adapt himself, if called upon, to other branches of work and the requirements of other shops in the same trade,

while the time which he will devote to the study of design and the artistic treatment of his work will raise his status in the trade and place him on a very different level from that which he would probably occupy without such training.

Curriculum. The curriculum includes the following subjects:

Elementary mensuration, geometry, geometrical drawing, free-hand and model drawing, modelling in clay and wax, heraldry, plant study, colour, elementary science, English composition, history, geography, workshop drawing, technology of metals and tools, bench work, and physical exercises.

Practical work. The practical work comprises filing, piercing, jointing, smithing, square box work, mounting, blowpipe work, chasing, metal carving, and the use of small hand tools generally. The course is a three years' one, and, in the third year, a somewhat higher degree of specialization is permitted.

Admission Test. The school is open to boys who are capable of doing the work of the seventh year of an elementary school (about 14 years of age).
Fees. The fee is \$7.50 per year, but the Council reserves the right to remit in whole or in part the fees of those whose parents are in receipt of not more than \$10 per week.

II. THE BOOK-PRODUCTION TRADES

Admission. Fees. Boys enter between 13 and 14. They are apprenticed at the end of the first year to some firm of recognized standing and the time spent in the school after reaching 14 years of age counts as part of their period of apprenticeship. Fees and terms of admission are the same as in the School of Silversmithing.

Curriculum. During the first year the curriculum includes craft work, English, citizenship, history, geography, practical mathematics, preliminary science, drawing, design, physical exercises. In the second and third years the pupils devote themselves either to book-binding or to typography on the craft side, according to the trade to which they are apprenticed. Some substantial attention is also paid to lithography, engraving, process-engraving, estimating and the history of the "book."

SHOREDITCH TECHNICAL INSTITUTE

GENERAL

This institution is intended for those engaged in the furnishing, building, electrical, and other trades. It comprises the following

Departments. departments:

1. Technical Day School for Boys.
2. Pupil-teachers' Handicraft Classes.
3. Domestic Economy Day School for Girls.

4. Day Trade School for Girls.
5. Evening Trade Classes for Men.
6. Evening Trade Classes for Women.

The accommodation consists of well-equipped work-shops, ^{Accommo-} class-rooms, chemistry and physics laboratories, and art rooms. ^{dation.}

The trade classes are confined to those actually engaged in the ^{Trade Classes.} trades who are earning their livelihood or are preparing to earn their livelihood thereby. Certificates are awarded by the Council to those who have completed the courses. The classes are intended to supplement work-shop practice and not to teach the trades. No pupil is allowed to take work-shop practice unless he takes in addition the lectures and the drawing office work in connection therewith. Work executed in material provided by the Council becomes its property; but pupils may generally obtain possession of the work by paying the cost of the material. A stall is provided for the purchase of all necessary supplies.

Apprentices, learners, and improvers under 21 years of age are ^{Fees.} admitted free on production of certificates from their employers or on showing copies of indentures.

Persons employed in trades or occupations upon which the teaching of the school has a distinct bearing are admitted to the Classes on payment of fees which vary from 60c. to \$5.00 a session, according to the course taken and the wages earned by the pupil.

TECHNICAL DAY SCHOOL FOR BOYS

The Technical Day School for Boys deserves especial notice. It is intended to prepare them for some branch of the furnishing ^{Aim.} or other wood-working trades, such as cabinet-makers, joiners, carpenters, shop-fitters, patternmakers, turners, wood engravers, and trade draughtsmen, etc.; to continue their general education and at the same time acquire such a knowledge of the principles of artistic designing and of construction, of the properties of materials and of the use of tools as will enable them at the end of a two or three years' course to enter the work-shop so trained as to be of immediate value to an employer.

The school is open to boys who are about 13 years of age and have reached about our Fourth Form standard. The fee for this ^{Admission tests.} School is \$6 a year, but the Council remits it in the case of a boy whose parents are in receipt of not more than \$10 a week.

The course extends over three years. In the second year the ^{Curriculum.} boys are taught the principles and practice of such art and metal work as is connected with the wood-working trades. In the third year some specialization is allowed. The course consists of the following subjects:

Arithmetic and mensuration, geometry and geometrical drawing, free-hand and model drawing, modelling in clay, elementary experimental science, English (composition, history, and geography), work-shop or technical drawing, technology of woods, metals, and tools, bench work in wood and metal.

**Handicraft for
Pupil-teachers**

Provision is here made for pupil-teachers who are to become handicraft teachers. This is said to be the only school of the kind in England. The three terms are identical with those of the Technical Day School for Boys.

DAY TRADE SCHOOL FOR GIRLS

Aim.

This School also deserves especial notice. It provides a training in skilled trades for girls leaving the elementary schools, and takes the place of apprenticeship. Attached to it there are Consultative Committees of trade employers and social workers, who, as experts, advise on all matters connected with trade work.

**Consultative
Committees.**

Admission.

Candidates must be resident in the County of London and be not less than 14 nor more than 16 years of age. They are selected after a qualifying examination in English composition and arithmetic and a competitive examination in freehand and model drawing and needlework. A recommendation must be produced from the head of the schools which they last attended. Ordinary pupils

Fees.

are admitted on payment of \$2.50 per term, \$7.50 per annum.

Organization.

The course as a rule extends over two years, commencing after the Easter vacation, but pupils are allowed to leave before the end of that time if, in the opinion of the Principal of the Institute, they are ready for the work-room. For the first three months, pupils are on probation; if at the end of that time they are making satisfactory progress, they are definitely admitted into the school.

About one-half of the school time is devoted to instruction under a skilled trade teacher in the trade chosen, and the other half to the improvement of the general education of the pupil, with special reference to the requirements of the trade. Such instruction includes free-hand and geometrical drawing, design, English, composition, arithmetic, some domestic subjects and physical exercises.

**Domestic
Economy Day
School for
Girls.**

Provision is here made for a ten months' day training in plain cooking, needle-work, and dressmaking, mending, laundry work, house management, personal cleanliness, and hygiene. The girls are supplied with dinner and tea and with certain materials for making garments. Thirty scholarship girls are admitted and other students, when possible, at the following fees:

(1) Girls under sixteen, \$2.50 a term and 8c. a day for meals.

(2) Girls over sixteen, \$5.00 a term and 12c. a day for meals.

EVENING TRADE CLASSES

Evening Trade Classes are provided for men in:

1. *Cabinet Making and Allied Trades*—Furniture design and workshop drawing, woodwork for beginners, wood carving, chair-making, French polishing and furniture enamelling, upholstery (stuffing, drapery, and drawing).

2. *Building and Other Trades*—Plumbing (drawing, practical work, elementary science), building construction (reading and execution of working drawings, setting out of masons', carpenters', plumbers', and slaters' work), electrical wiring and fitting, electrical instrument making and mechanical engineering, physics (for electricians), chemistry (chemical industries, polishers, enamellers, painters, and decorators), work-shop arithmetic and mensuration, metal work, van-building and wheelwrights' work, drawing and design, modelling, painters' and decorators' work, mechanical and geometrical drawing, English language and arithmetic.

Evening Trade Classes are provided for women in:

Cooking, upholstery, trade and home dressmaking, designing and making ready-made clothing, drawing and design, teachers' training classes in dressmaking and millinery.

As examples of the curricula of the foregoing, I have selected those for men in Upholstery and Plumbing:

UPHOLSTERY

Stuffing—Elementary: Pupils practise, from practical examples, such exercises as stuffing cushions, squabs, small chairs, easy chairs, etc., all of which are finished in calico, preparatory to being covered with different kinds of materials.

Stuffing—Advanced Class for Men: Special attention is paid to the treatment of spring stuffing of furniture in general; spring edge or rail stuffing; double spring stuffing, marking out coverings in such materials as morocco, tapestry, cretonne, etc.

Special Advanced Class for Men: To be admitted to this class, pupils must have a good working knowledge of the subjects taught in the advanced class. Attention is paid to the upholstering of drawing-room suites, couches, divans, Chesterfields, etc., both in the matter of stuffing and covering with tapestry or other suitable materials. Instruction is given in the cutting of loose covers.

Note.—In all the preceding classes, pupils are expected to join the Drawing Classes for Upholsterers and others.

Drapery: In this class the decorative side of upholstery is dealt with. The object is to give such instruction as will enable pupils to follow architects and decorators in the various styles of colour and treatment in such a way as to give to rooms when finished continuity and fitness. Introductory remarks on the general principles involved in interior decoration and furnishing. Ground plans of rooms set to scale; plans showing floor, walls, and ceiling—Room to scale in perspective. Various floor coverings; how to measure and calculate necessary quantities. How to measure for blinds, curtains, vitrage, etc., with short lectures on the

various fittings and appliances used. Cutting and mounting of roller blinds. Cutting of curtains; various headings. The cutting and pleating of curtains, with distribution of fulness, for semi-circles or portions of semi-circles, and application of principle to all irregular headings. Cutting of "pelmetts" with straight or circular heads. Festoon draperies—how to cut and pleat. Bed hangings for the various styles of beds in use at home and in the Colonies (mosquito nets). Elementary instruction in the various historical styles of decoration. Elementary instruction in the arrangement of colours as applied to decoration and upholstery.

Pupils are required to attend the special Drawing Class for Upholsterers.

Drawing: To take a high place in the upholstery or furniture trade a workman must be an expert draughtsman, not only in general, free-hand and geometrical drawing, but also in light and shade and colour; and a course is provided to enable young upholsterers and furniture draughtsmen to appreciate form, accurate arrangement, balance and the general appearance and special features of the various periods and styles of drapery and upholstery. Lessons and short lectures are given in methods of measuring; study of the fall of drapery of the same design cut in various materials; free-hand drawing from copies and models; the study of light and shade in pencil and water-colour; setting out for cutting and the application of geometry to same.

Pupils who have little power of drawing are required to attend the Elementary Drawing Class.

PLUMBING

The course in Plumbing below is one of the departments provided under Building and Other Trades:

Drawing: This class, held one evening a week, gives such instruction as will enable a plumber to understand and set out his work from given dimensions. The syllabus is as follows:—

The development of surfaces with special reference to the cutting out of sheet lead for elbows or knees in circular or rectangular pipes, conical trumpet mouths, also the covering of various architectural designs; elements of geometry—meaning of plan, elevation, section and the setting out of detailed work.

Lectures are given on the principles of drainage, sanitary appliances, roof work, etc.

Practical Work: The course of instruction has been arranged to cover the whole work of a practical plumber. There are two classes, elementary and advanced.

Workshop Practice: Tools—their forms and uses; making and fusing of solder; soldering apparatus; fire-places, etc. Pipe bending in various sizes, both round and square, with the use of dummies or by bobbin and followers. Joint wiping; all kinds of joint work, from $\frac{1}{2}$ inch to 4 inch pipes in all positions, viz., upright, underhand, branch, knuckle, flange and seam. Wiping; soil pipe and anti-syphonage work in accordance with the latest principles. Setting out and bossing up all kinds of breaks and corners in sheet lead.

Special attention is given this branch of the plumbers' work, so that students may gain a thorough knowledge of lead laying in various forms.

Elementary pupils attached to these classes are expected to attend the Workshop Arithmetic and Mensuration Class. Pupils attending Practical Classes are expected to attend the Drawing and Lecture Class for Plumbers. Special stress is placed on the course of Elementary Science for Plumbers, in which many of the scientific principles underlying their work are carefully explained and illustrated. Such knowledge is absolutely

essential to pupils desirous of passing examinations in the Theory and Practice of Plumbing, with a view of becoming Registered Plumbers.

Elementary Science: The course deals with the physical and chemical principles involved in the theory and practice of plumbing. These are taught in an elementary but thorough manner, the lectures being fully illustrated by experiments and supplemented by practical work on the part of the pupils. The course covers the requirements of the examination of the City and Guilds of London Institute (Preliminary and Ordinary Grades). The scope of the subjects is shown in the following summary:—

Introductory mechanical notions; force and work; the lever, pulley block, screw, etc. Determination of areas, volumes and weights. Density and specific gravity. Pressure due to a column of liquid. Head of water. Pressure due to action of gases. The barometer. Boyle's Law. Theory of the syphon, traps, valves, house cistern fittings. Pumps, hydraulic press, ram, etc. Capillarity, roof leakage, etc., through capillary action. Effects of heat upon solids, liquids and gases. Temperature; thermometers. Co-efficients of expansion. Conduction, convection and radiation. Hot water circulation. Ventilation of pipes. Expansion of water. Quantity of heat and its measurements. Specific heat of water and of plumbers' materials. Latent heat of water and of steam. Properties of ice; frost-bursts. Melting points of metals and solders. Boiling point of water under pressure. The simple chemistry of the metals in relation to air and water. Natural waters and their action on metals and solders. Furring of pipes and boilers. Red lead, litharge, white lead, etc., and the cements made from them. Action of acids upon metals and salts. Replacement of metal by metal; "electrolysis."

MONOTECHNIC SCHOOL OF BUILDING AT BRIXTON

GENERAL

The Monotechnic School of Building at Brixton was established by the London County Council for the training of artisans engaged in the building and allied trades. Workshops are provided and equipped for practical teaching under conditions similar to those met with on buildings and in builders' shops. To complete the scheme of work, a School of Architecture has been added with courses of instruction in the history of building and architectural designing, planning, and drawing.

Accommodation,
Equipment and
Organization.

Lecture and class-rooms, drawing offices and laboratories have been provided in connection with the work-shops, so that the practical work may be combined with the class studies.

Every facility is given for full size work and for this purpose the various trades act in conjunction. Great importance is attached to the practical combination of the studies in the several trades and branches as required by a master builder, foreman or architect; and for this purpose an architectural director has been appointed.

The classes are held in the evening, from once to three times a week, usually from 7.30 to 9.30.

EVENING CLASSES

Departments
of Work.

The work of the school may be divided into three departments, as follows:

I. *Trade Classes.*

Brick work, carpentry and joinery, staircasing and hand-railing, joiners' machine class, etc.; masonry, painting and decorating; plastering; plumbing, ornamental lead work, iron pipe work, etc.; sanitary engineering; stone carving, wood carving and modelling; wrought iron work.

In the practical Trade Classes only those engaged in the trade are admitted. These classes are intended to supplement work-shop practice, not to teach trades completely. Apprentices, learners and improvers under the age of 21 are admitted free on producing certificates from their employers or on showing copies of their indentures. Persons employed in trades or occupations upon which the teaching of the school has a bearing are admitted to the evening classes on payment of fees which vary according to the wages the applicant earns.

II. *Building Construction and Allied Subjects.*

Builders' bookkeeping, estimating; office routine, construction, mechanics of building and constructional steel work; building or quantity surveying; chemistry and physics of building materials, geometry; land surveying and valuation; workshop arithmetic, practical mechanics.

III. *Architecture and Drawing.*

Architectural design, working details, and perspective drawing; architectural history; free-hand and model drawing; lettering and inscriptions for drawings; sketching and measuring buildings and details. These courses are held at the Victoria and Albert Museum, South Kensington.

Besides the foregoing evening courses, the details of which I omit, there is also a Day Technical School for Boys.

DAY TECHNICAL SCHOOL FOR BOYS

Aim.

This school, which is a Day Trade School for boys, and is, therefore, especially noticeable, provides scientific and technical training extending over three years for those preparing to enter the building trades and allied vocations. Admission is restricted

Admission
tests.

to boys between 13 and 15 who have passed the sixth standard (senior third) of the Elementary School or its equivalent. The

Fees.

fees are \$2.50 a term, or \$7.50 a year. For the second and third years of those intending to become craftsmen, or to enter builders', surveyors' or architects' offices, the fees are \$7.50 a term.

All are entitled to the free use of drawing boards, tools, drawing instruments, paper, textbooks, note books, apparatus and material for workshop practice and laboratory instruction, etc.

The curriculum which is common to all pupils during the first Curriculum. year includes:—

Building construction, work-shop practice, study of materials, work-shop arithmetic and mathematics, experimental mechanics, geometrical and plan drawing and lettering, free-hand drawing of building details, English literature, history with special reference to industrial changes and the development of public and domestic architecture, geography with special reference to building materials, English composition, and business correspondence.

In the second and third year the course is divided into two main sections:

1. The Artisan Course for Bricklayers, Masons, Carpenters, Plumbers, Painters, etc., and
2. The Higher Course for Architects, Builders, and Surveyors.

During these two years, the instruction in building construction for all pupils is of a more advanced character, and general elementary science with reference to building materials and the mechanics of building are added.

Pupils taking the Artisan Course specialize in the trade which they intend to follow. The pupils in the Higher Course are instructed in the various trades in rotation, and to their curriculum are added building quantities, architectural drawing and land-surveying.

At the end of the first year, the Principal advises the parents of pupils as to the most suitable branch or craft to select for their sons.

BOROUGH POLYTECHNIC INSTITUTE

GENERAL

The technical schools already described are maintained and managed wholly by the London County Council. The Borough Polytechnic Institute, founded in 1892, is an example of a technical school supported partly by the London County Council and partly by other bodies, as well as by fees. Its income is derived chiefly from grants made by the following:

London County Council, Board of Education, Central Governing Body, Governors of Herold's Foundation, Trustees of St. Mary (Newington), National Association of Master Bakers and Confectioners, London Master Bakers' Protection Society, and Trustees of St. Olave and St. John (Southwark).

This Institute is one of the most comprehensive I saw in England. With it are affiliated four London County Council Commercial, Science, and Art Centres, Morley College, and Herold's Institute, the last two providing both elementary and advanced technical instruction. It is, accordingly, able to offer a very wide

Sources of
Income.

Affiliated
Institutions.

Aims.

range of subjects, and the courses include not only day and evening trade classes, but technical work of a higher character. The first object of the Institute is to provide for the instruction of young men and women engaged in the various trades and industries of Central South London; the secondary object is to promote general knowledge by means of classes in arts and crafts, higher commercial subjects, languages, domestic economy, music, etc.; and, lastly, the Institute does much to facilitate social intercourse amongst its students. Membership carries with it certain privileges, and healthy recreation and amusement are afforded by its various clubs and societies.

Physical Training.

Every opportunity is given for physical training and development. The Playing Fields are within easy distance by street car, and there are clubs connected with the various branches of sport, football, cricket, cycling, hockey, swimming, rowing, cross-country running, etc. There are two gymnasia—the Victoria, for men, where instruction is given in drill, gymnastics, fencing, and boxing; and the Stanley, for women, which is well equipped with Swedish apparatus.

Organization.

The work of the Institute is divided into two branches: Day Schools and Classes, and Evening Classes.

DAY SCHOOLS AND CLASSES

Under this head are comprised:

1. Trade School for Girls.
2. Technical Day School for Boys.
3. Domestic Economy School for Girls.
4. The "National" School of Bakery and Confectionery.
5. Music Classes for Boys and Girls.

The attendance at the Day Classes runs from 300 to 400.

EVENING CLASSES

The following are the main departments of the Evening Classes:

1. *Special Trade Classes*.—For engineers, metal plate workers, bricklayers, carpenters, plumbers, tailors, boot and shoe makers, printers, bookbinders, wheelwrights, varnish and colour makers, bakers and confectioners.

2. *Engineering and Building Trades Department*. — Practical geometry, machine construction, applied mechanics, heat engines, practical mathematics, building construction, builders' quantities, motor-car designing and construction. This department is carried on in a block of buildings, consisting of a laboratory 80 feet by 25

feet, above which on the first floor are the engineering drawing offices and the engineering lecture theatre, and on the second floor geometrical drawing offices and builders' drawing office. The drawing offices are lighted by inverted arc lamps, giving a diffused light and are provided with lanterns, screens, and blue printing apparatus.

3. *Chemistry*.—Organic, inorganic, and electro-chemistry. This department, for example, is provided with three laboratories for practical work of all kinds. The first accommodates 100 students, the second 20, and the third is a small one for special research work.

4. *Electrical Department*.—Magnetism and electricity, electro-technics, electric lighting, wiremen's work, etc. In this department, the accommodation provided consists of a lecture theatre, two large laboratories, and a small one for special work.

5. *Science Classes*.—Mathematics, physiology, and hygiene.

6. *Arts and Crafts*.—Modelling, woodcarving, design, etc.

7. *Women's Technical and Domestic Economy Classes*.—Mil-linery, dressmaking, embroidery, cookery, needlework, sick nursing, etc.

8. *Higher Commercial and General Classes*.—Languages, commercial and local government law, economics, banking and currency, machinery of business, accountancy, etc.

9. *Music and Elocution Classes*.—Pianoforte, violin, singing, mandoline, elocution.

The attendance at the evening classes runs from 3,000 to 3,500.

The Special Trade Classes are intended only for those actually working at the respective trades, and on no account will others be admitted.

Students are required to attend the theoretical as well as the practical classes; those not complying with this rule are liable to suspension.

In certain trade classes (engineering, brass-finishing, pattern-making, etc.), where practical instruction only is given, students are required to attend a drawing or mathematics class (to which they are admitted at a reduced fee). No student is admitted to the practical class who does not fulfil this condition.

Apprentices and others under 21 years of age are admitted to any particular trade class at half fees on production of a letter from their employer or foreman stating that they are actually working at that trade.

The London County Council offers, in open competition, evening scholarships in art, science, and technology. There are also valuable special class prizes.

**Examinations
and Rewards.**

Examinations are held in many of the subjects, and money prizes, silver and bronze medals, and certificates are awarded by the Board of Education, the City and Guilds of London Institute, and the Royal Society of Arts, on the results of the examinations respectively held by those bodies at the end of the session. Students are expected to sit for examination in their subjects of study.

As suggestive examples of the work done in this Institute, I submit a statement of the organization and character of the Day Trade School for Girls, the Technical Day School for Boys, the "National" School of Bakery and Confectionery, and the Letterpress Printing Department. As the curricula of the two last-named will prove interesting, I submit also their main details:

TRADE DAY SCHOOL FOR GIRLS

This school is divided into the Trade School and the Domestic Economy School.

**Advisory
Committees.**

The Governors have secured the services of employers who act as Advisory Committees in connection with each trade, and their supervision of the work ensures its reaching a high standard. The trade teacher of each section has been selected by the Advisory Committee and has had experience in good work-rooms.

**Admission
tests.**

Candidates for admission to either must be at least 14 years of age, or must have passed Standard 7 of the Elementary School (about our Junior Fourth Form).

Trades.

Instruction is given in waistcoat-making, ladies' tailoring, dress-making, upholstery, and laundry work.

Organization.

The course of instruction, as a rule, extends over a period of two years, and pupils are not admitted unless they are prepared to stay for that time. For the first three months pupils are considered to be on probation; if, at the end of that time, they are making satisfactory progress, they are definitely admitted into the school; but any pupil who shows no aptitude for the trade or whose conduct is unsatisfactory is required to withdraw.

**Character
of Trade
Instruction.**

The trades selected offer every prospect of a good livelihood to capable workers; and special care is taken to ensure that the pupils shall, as far as is possible in the time at their disposal, receive an all-round training, and acquire some knowledge of every branch of their trade, so that they may in after life be able to adapt themselves to the varied requirements of different firms.

A girl of average ability who takes full advantage of the training offered by this Trade School should, after two or three years of work-room experience, become one of the skilled, intelligent workers for whom there is always demand, and should rise to a responsible position.

At the end of the course, places are found for pupils whose school record is satisfactory.

The Domestic Economy School is for girls who desire training in the various branches of household work: Cookery, dressmaking, drawing, laundry work, housewifery, hygiene, sick nursing, and first aid, physical exercises. Domestic
Economy
School.

TECHNICAL DAY SCHOOL FOR BOYS

This school was founded to provide boys with a preparatory ^{Aim.} trade training. A general education combined with manual training is given by highly qualified teachers in the commodious class rooms, art rooms, drawing offices, engineering, chemical and physics laboratories, and in the wood, metal or other work-shops, all of which are specially fitted with modern appliances.

Boys are eligible for admission to the school who are over 12 ^{Admission tests.} years of age and have passed Standard 6 (Senior Third Form) of an elementary school, or have received an equivalent education.

The course of instruction and the subjects and the hours devoted ^{Curriculum.} to each per week are as follows:

First Year—Mathematics, 5; English, 6; Science, 4; Geometry and Mechanical Drawing, 4; Art Drawing, 1½; Work-shop Practice, 5½; Physical Exercises, 1½. All take this course.

Second Year—Mathematics, 4; Literary Subjects, 6; Science, 4¾; Drawing, 6½; Work-shop Practice, 5; Physical Exercises, 1½. This course is for boys who decide to enter the Engineering trade, or any branch of metal work.

Third Year—Mathematics, 5; Literary Subjects, 6; Science, 5½; Drawing, 4½; Work-shop Practice, 8; Physical Exercises, 1.

For those who intend to follow the trades, such as Bookbinding, Tailoring, Printing, etc., the course is modified in the second year, and considerably changed in the third, more time being given to Art work or special work connected with the particular trade the pupil intends to follow. Specialization

For boys showing special aptitude and desiring to remain in the school for a fourth year, further specialization is arranged.

"NATIONAL" SCHOOL OF BAKERY AND CONFECTIONERY

This school forms a special department of the Borough Polytechnic work. The claim is made that it is the only one of its kind in the United Kingdom. It is managed, subject to the approval of the Governing Body of the Polytechnic, by the Education Committee of the National Association of Master Bakers and Confectioners, which body contributes an annual sum not exceeding \$2,500. Any individual, society, or firm, contributing not less Management.

than \$125 a year, may appoint a representative upon the Education Committee. The London Master Bakers' Protection Society has contributed \$250 annually for some years past.

The staff consists of three teachers: One in the Bread Section, including physics, chemistry, bacteriology, etc.; one in the Confectionery Section, and one in Drawing and Modelling.

Prominent scientists and leading members of the trade give occasional lectures, which are from time to time announced to the pupils and advertised to the general trade.

Arrangements are made for pupils to visit flour mills, bakeries, yeast distilleries, and other places of trade interest.

Organization. There are both Day and Evening Courses. Both provide elementary and advanced instruction in Bread and Confectionery making. No student is allowed to take the Advanced Course unless he proves by examination, to the teacher's and the committee's satisfaction, that he has experience and aptitude sufficient to justify his inclusion.

Fees. For the whole or part session, September to May, the fee for Day Students is \$36.50.

For the Evening Students' Elementary Courses the fee is \$2.50 the session for each course. For the Advanced Courses the fee is \$2.50 the session for each course.

Accommodations and equipment. The school is provided with two large bakeries, equipped with all the most modern machinery and appliances, class-rooms, a laboratory, store-rooms, and all the necessary accessories of what is practically a Bakers' and Confectioners' College. The last additions, with equipment, have cost nearly \$20,000. Towards this capital outlay the National Association of Master Bakers and Confectioners contributed \$1,250, and the London County Council Technical Education Board contributed \$8,750, and presented to the National Association the necessary ovens and machinery for the bakehouses. Further important additions and alterations are now being made at a cost of over \$7,500.

Examinations, and Rewards. All pupils must take the official examinations which are held by the City and Guilds of London Institute in connection with the National Association.

In connection with the examinations at the School, the Worshipful Company of Bakers offer the Freedom of their Company to the two students who secure the highest marks in the first class Honours Division in Bread-making and in Confectionery.

Similar examinations are also held by the City Guilds and the National Association in various centres throughout the country. In the Bread Section of these examinations, the Netherlands Yeast

and Spirit Factory, Delft, offers a Scholarship of the value of \$125, tenable at the School, to the most successful candidate in the ordinary grade.

To obtain a full technological certificate in Honours, students must qualify in two of the following subjects, Chemistry, Hygiene, Physiology, Steam, etc., in addition to those taught in the School itself, but provision for teaching these subjects is made in the Polytechnic, and students of the Bakery School are admitted to these classes at half fees. Certificates.

Following are the main details of the Day School curriculum of the National School of Bakery and Confectionery. The evening courses are similar, but less comprehensive:

ELEMENTARY DAY COURSE

Breadmaking: The wheat berry; flour; starches; yeasts; commercial yeasts; ovens; hot plate goods; bakery arithmetic; machinery; yeast foods and yeast stimulants; breads and rolls.

Confectionery: Sponge goods; puff paste; short paste; biscuits; cocoanut goods; small powdered goods; ginger confectionery; shortbread goods; cakes (assorted); fondant and water icing; syrups; pies; glacé royale; piping; substitutes.

Drawing and Modelling: Geometrical drawing.—Definitions, measurements and construction of simple geometrical figures with application. Scrolls for sides, and “tops” for cakes; fancy scroll work suitable for chocolate medallions; lettering. Old English and plain block, etc.; modelling of fruits, leaves and flowers.

Chemistry: The course includes, amongst other subjects: Properties of matter, chemical analysis, synthesis, solutions, mixtures, chemical elements, compounds, production of, and properties of gases: Oxygen, hydrogen, carbonic oxide, carbon dioxide, etc. Composition and properties of water, matter in solution, solvent properties, acids, bases, salts, action and properties of chemicals used in trade. Composition and properties of air. Composition of fuels and properties of gases produced in burning, solvent action of acids, alkalies and alcohols. Chemical calculations, construction of formulæ and equations, atomic and molecular weights. Composition and properties of starch, dextrin, glucose, sugar, alcohol, etc., etc.; composition and properties of butter, fats, butter substitutes, milk, etc., etc.

Physics: Measurements of weights and volume; British and Metric systems; equivalents and calculations; specific gravity of liquids and solids; S.G. of water, alcohol, fats; use and management of balance, hydrometer, saccharometer; use and management of microscope; effects of heat on metals, liquids and gases; heat values of fuels; specific heat, thermometers, heat transmission, conduction, convection, radiation; equivalents of steam temperatures and pressures. Ratio of surface to mass. Ventilation, and laws governing. Heat calculations, etc. Specific gravity of milk, butter, fats, melting points, etc.

ADVANCED DAY COURSE

Breadmaking: The course consists essentially of advanced work and demonstration of subjects enumerated for elementary course, with the addition of research work into what may be called the pathological condi-

tions of breadmaking. Thus, sourness in yeast and in bread is investigated by deliberately producing those abnormal conditions, and noting carefully the varying degrees of change with all accompanying phenomena. Such problems as the possible and the safe range of temperatures for yeasts, sponges, and doughs; the moistening and keeping properties of potatoes, sugar, etc., in bread; the relative yield as affected by ovens, machinery, etc.; the deterring properties of salt and its limits; the "felling" or over solidifying effects of machines; the persistence of holes; the lesser and greater causes of crumbling in bread; the economic limits of baking temperature; the economic use of fuel; and many other unsolved problems are investigated with a view to definite answers.

In addition, the advanced students are instructed in a more extended system of bakehouse and store bookkeeping, including bread delivery, working expenses, etc.

Confectionery: The course deals fully with the method of preparing—Continental fermented goods; fancy cakes; gateaux; fancies for afternoon tea and buffet table; hot and cold entremets; jellies, creams and assorted; puff paste; wine and dessert biscuits; ices; piping and decorative work; preserving and crystallizing; machine and hand-made slabs; meringue goods.

Drawing and Modelling: More advanced work on the lines laid down for the Elementary Course is given, and in addition Lettering—Latin, German, Text, etc.; fancy scroll work for birthday cakes, etc.; advanced modelling for fruits, borders and other decorative work; designs for cake piping in figures, fancy leaves, etc.

Biology: The course includes microscopic manipulation; section cutting and mounting; special study of vegetable cells, including all forms of starches; microscopic examination of yeast and all allied fungi; study of lactic, acetic, butyric, and other forms of bacteria; behaviour of yeast under abnormal conditions; method of yeast culture; preparation and effects of yeast foods; effects of oxygen and other gases; effects of salt, acids, alkalies, sulphurs, etc., etc.; formation of buds and of spores, etc., etc.

LETTERPRESS PRINTING DEPARTMENT

The following courses are held in the evening, and deal with Composing and kindred departments, covering the syllabus of the City and Guilds of London Institute for their various examinations.

PRELIMINARY (Apprentices)

The lectures in each grade are given once a week: Spelling; punctuation; appliances and material used in case room; technical terms generally; composition of type metal; qualities of good type; description of the parts of a type; weight of type and leads; relationship of type bodies and their proportion to foot; lays of the case; characters in a fount; casing letter; attitude at frame; rules to remember when setting; habits to acquire and avoid; rules for spacing and justifying; rules for dividing words; rules for distributing; locking-up and unlocking; casting up matter; readers' marks; signatures and their use; definition of stereo, electro, line and half-tone blocks. Candidates for the examinations are expected to show some knowledge of Elementary Geometry and Freehand Drawing.

ORDINARY GRADE

All the matter contained in the Preliminary Syllabus; production of bookwork; casting off MS.; preliminary matter—how to set; notes—how to set; making-up—various operations; proportion of type to page; measures for bookwork; making margin; imposition; sheet and half sheet work;

signatures; various problems in type bodies; point system; display in its various phases; use of ornament in display; use of borders and vignettes, etc.; classification of job-work; harmony of colour; composition of colour work; tint blocks; sketching (rough); table work—how to set; paper—machine and hand-made, various sub-divisions, qualities and weights, equivalent weights.

HONOURS GRADE

Candidates for Examination in the Honours Grade must have previously obtained a certificate in the Ordinary Grade. The questions are not limited to any particular syllabus, but are based upon the groundwork of the syllabuses for the Preliminary and Ordinary Grade examinations, with a wide range of the whole subject of letterpress printing, and include such subjects as the following:—

Construction and management of the hand-press and of platen, cylinder, perfecting, and rotary machines; making-ready; rollers—their manufacture and treatment; the processes of stereotyping and electrotyping; process blocks—line and half-tone; their production and suitability for various classes of work; inks—black and coloured, treatment of; three colour work; composing and distributing machines; power—steam, gas, and electric; shafting and gearing; the principles of estimating; charging up work; the various essentials required for the production of a perfectly printed book; bookkeeping for printers; general management; the warehouse; cost generally of plant, material, paper, etc.

PRACTICAL WORK

Three evenings a week are devoted to Practical Work of every description, for which a very large well-selected Plant of Type (including Borders and Ornament based on the labour-saving principle), Printing Appliances and Machinery have been provided.

In view of their values in Display Work students are recommended to attend the Classes in Drawing and Elementary Design, held in the Art Department of the Institute.

Besides the foregoing provisions for Evening Classes, Afternoon Classes are held for apprentices who have obtained permission from their employers to attend. The lectures are twice a week from 5.30 to 7 p.m., and the practical work once a week, from 7.45 to 9.45.

Afternoon
classes for
apprentices.

MANCHESTER

MUNICIPAL SCHOOL OF TECHNOLOGY

GENERAL

The provision for technical education in Manchester is famous. Its Municipal School of Technology, originally a Mechanics' Institute, cost upwards of \$1,500,000, and is one of the finest and best equipped buildings I saw in Europe. The building of the Municipal School of Art is in a different part of the city, and, though well equipped, is by no means so handsome and spacious. As elsewhere in England, the Education Committee of the city controls its schools from the lowest to the highest grade, and as Manchester is a distributing as well as a manufacturing centre with varied activities, its system is extensive and complex.

Accommodation,
equipment and
control.

FACULTY OF TECHNOLOGY

Connection
with Victoria
University.

The Royal Charter establishing the Victoria University of Manchester provides for the establishment of a Faculty of Technology, but the City Council and the University have come to an agreement under which certain departments of the school constitute the Faculty. The University confers the degrees of Bachelor and Master of Technical Science (B.Sc.Tech., and M.Sc.Tech.), and the holder of the latter may compete later for the degree of Doctor of Science. Besides providing technological instruction, the staff of the school performs other important functions. It has carried out a large number of tests for various firms in the city and districts, and the facilities which the school affords for mechanical and electrical tests and analyses of a chemical nature are constantly increasing. The members of the staff also do a large amount of original work.

DAY CLASSES

Matriculation
requirements.

Students of the Faculty intending to proceed to a degree must first pass the examination for matriculation of the Joint Board of the Northern Universities or an examination accepted as equivalent thereto, and, at some subsequent period in the 1st or 2nd year of their three years' course, an intermediate examination in science before presenting themselves for the final examination for the degree. Students also on passing the entrance examination of the school, or some equivalent examination, may proceed after three years' training to a certificate of the University in Technical Science.

Compared with the matriculation examination of the Faculty of Applied Science and Engineering of Toronto University, the course for the entrance examination is noticeably difficult. It embraces the following subjects:

English: Dictation, composition, grammar, physical and political geography, English history.

Mathematics: Arithmetic—Elementary rules with vulgar and decimal fractions, and square root; algebra (to quadratics), geometry (six books), plane trigonometry; use of four-figure tables of logarithms, and trigonometrical fractions.

Geometrical Drawing: Plane and solid.

Freehand Drawing (simple).

NOTE—Candidates take either, but not both of the preceding.

Model Drawing: Sketching some solid object or group of objects.

Latin, or German, or French: The elements of the grammar; translation at sight of easy passages or sentences into English; translation of English into Latin, or German, or French.

General Science: Mechanics (kinematics and kinetics, statics, simple machines, hydrostatics).

Physics: Matter; heat, magnetism and electricity.

Chemistry: Inorganic, metals and non-metals and their compounds; the theory.

The course of instruction for the degree or the certificate is intended to prepare men for responsible positions in industrial life.

The Technological Day courses cover three years; but, as they are of the University grade and of little importance to this enquiry, I submit only a general statement. Technological day courses.

The courses are as follows:

Mathematical. First year general. Mechanical engineering. Physics and electrical engineering. Municipal and sanitary engineering. Applied chemistry (general technological chemistry); chemistry of textiles (bleaching, dyeing, and printing); manufacture of paper; metallurgy and assaying; brewing; electro-chemistry; photography. Textile manufacture. Photography and the printing crafts.

The first year general course for the mechanical, electrical, and sanitary engineering, and applied chemistry departments embraces:

English, German, geometrical drawing, engineering drawing, mechanics, physics, chemistry, with laboratory courses, woodwork—theoretical course, consisting of lectures on timber, woodworking, tools, and wood-turning, with a practical course in drawing, bench work, lathe work, and pattern-making.

The technological day courses are practical throughout. For example, the department of electrical engineering is provided with the following laboratories: Equipment.

Materials testing, hydraulic machine testing, steam engine, gas and oil engine, and mechanics.

Like the American Technological Institutions, this school has a complete equipment of "shops":

The woodworking shop has an equipment of circular and band saws, moulding, tenoning, mortising, grinding machines, and turning lathes, all electrically driven, together with suitable bench accommodation.

The engineering workshops are fitted with modern tools of British and American types, and include a special tool room equipped with fine grinding machines and other high-grade tools for gauge making and standardised work by modern methods.

The smithy contains a steam hammer, eleven forges, and a large hearth, and the Foundry is equipped for making small sand castings in brass and lead.

In addition to the foregoing technological courses, there are special day courses for men and women:

Special day
classes.

1. *For Apprentices* nominated by their employers, who excuse them from work for sometimes a whole day a week and occasionally pay their fees, courses are provided as follows:

Engineers' apprentices (three years), plumbers' apprentices (two years), painters' and decorators' apprentices (three years), assistants in public libraries (three years), architecture and building construction (two years).

2. *For Women*—Theoretical and practical dressmaking, plain and art needle-work, millinery, training course for teachers.

3. *For Teachers*—Special classes in manual training in wood-work and metal work, partly day and partly evening.

EVENING CLASSES

The courses of instruction in the Evening Classes are designed to give systematic training in the principles of Science and Art as applied to the commerce and industry of the city and district.

Entrance
tests.

Before entering, the student must possess attainments at least equal to the Seventh Standard (our Form IV) of an elementary school, but special stress is laid on mechanics and drawing. For students not possessed of this indispensable preliminary knowledge, provision is made in the Evening Continuation Schools and in the preparatory Technical and Commercial Schools established in various districts of the city. Summer evening courses are also provided, beginning the end of April and ending toward the close of July.

In many subjects the preparatory training required is of a special character, and students are not admitted unless they give satisfactory evidence that they can enter with advantage.

Organization
of courses.

The courses lead to a diploma or a certificate, and extend over five and three years respectively, according as the industries require a high degree of scientific theory and training, or handicraft skill combined with an accurate knowledge of general principles. All lay a broad general foundation of sound mathematics, drawing, and science leading up to more specialized study, at a later stage, of those subjects which are of direct value and interest. The five years' course entitles the student to the diploma of the school with the title of Associate, and the three years' course to the certificate of competency in the particular branch of study he has undertaken.

Curriculum.

The subjects of the evening courses are as follows. I give a list to show the comprehensiveness of the provision in the school for technical training of various kinds:

Pure and Applied Mathematics: including Mathematics for surveyors.

General Science: Physics, Chemistry, Geology, descriptive Astronomy and Meteorology, Botany, Physiology, Hygiene, Microscopic Research.

Mechanical Engineering: Machine construction and drawing, applied mechanics, heat engines, theory of the steam boiler, theory of the steam turbine, theory of machines, hydraulics, strength of materials, engineers' quantities in estimating, graphics and statics of structures, pattern making, practical mechanical engineering, rail carriage and wagon building, road carriage and motor car building, van and cart building, coal mining and mining surveying. Course for locomotive drivers, firemen, and cleaners.

Electrical Engineering: Electro-chemistry, electro-metallurgy, telegraphy and telephony, electric wiring and fitting, electric instrument making, electrical traction for motor men.

Building Industries: Building construction and drawing, carpentry and joinery, constructional iron and steel work, ferro-concrete construction, structural designing, graphics, statics for builders, builders' quantities; house painting and decoration; masonry; staircasing and handrailing; cabinet making; metal plate work.

Municipal and Sanitary Engineering: Plumbers' work; sanitary engineering and inspection; municipal engineering; land and engineering surveying.

Industrial Chemistry: Metallurgy; iron founding; iron and steel manufacture; bread making and flour confectionery; brewing; water analysis; oils and fats; chemistry of essential oils and other aromatic substances; painters' oils, colours, and varnishes; gas engineering and supply; gas supply, technical gas analysis; coal-tar distillation and coal-tar products; technical research and construction of plant; photography; photo-mechanical processes; cotton and linen bleaching and dyeing; calico and linen printing; practical courses in bleaching, dyeing, printing and finishing machinery; paper manufacture; technology of bleaching, dyeing, printing and finishing machinery; special course in dyed and printed goods for buyers and salesmen; engraving for calico printers.

Printing Industries: Typography; lithography; bookbinding.

Textile Industries: Cotton spinning; cotton and cotton yarn for buyers and salesmen; cotton weaving and designing; silk manufacture; textile fabric course for buyers and salesmen; textile engineering courses.

Domestic Economy: Dressmaking; millinery.

Special Courses: Board work for apprentices, improvers and assistants engaged in the craft of hairdressing. Principles and practice of horseshoeing. Flour manufacture. Foodstuffs.

Introductory Courses: In branch evening schools in elementary science and in Art and Drawing.

Summer Evening Courses.

MANUAL TRAINING FOR TEACHERS

As is also the case in the other large centres in England, Manchester provides a Manual Training Class for teachers in wood-working and metalworking in the evenings and on Saturdays.

Woodwork.

In woodworking the course is a two years' one. Fee, \$4.25, including the examination fee, \$1.75. Each fee includes the use of ^{tools} ~~tools~~ and materials for the course.

Aim.

The class is established to give teachers of public elementary and secondary schools and, under certain conditions, other persons, a practical knowledge of the use of woodworking tools, of geometrical drawing, isometric projection, and of drawing to scale as applied to woodworking, with the more especial object of enabling them to introduce manual training into elementary and secondary schools. A spacious workshop, well fitted with benches and appliances, is provided for thirty students, each of whom is supplied with a locker and a complete set of tools.

Organization of course.

The course, which consists of about thirty lessons of two and a half hours each, is carefully graduated, and includes instruction in the nature, use, and object of the tools and materials employed, the best methods of preparing drawings and laying out the work, in the application of descriptive geometry to woodworking. Opportunity is given for discussions on the methods, aims, and educational bearing of the course of instruction.

The course of instruction and workshop practice prepares candidates for the examination in Manual Training, held in May and June by the City and Guilds of London Institute, which body grants certificates. All candidates must have had at least twenty practical woodworking lessons, each of not less than two hours' duration, during the session preceding each examination, in a class registered by the Institute.

Examinations.

The examination held at the end of the First Year's Course consists of (1) Drawing, (2) a simple Literary Test, (3) Practical Exercises in woodworking. Candidates are expected to show a knowledge of drawing to scale and projection, and ability to draw to scale, in plan and elevation, any simple joint, and very simple combinations of the same to dimensions or sketches.

The Final or Second Year's Examination, which is open only to candidates who have passed the First Year's Examination, comprises drawing to scale and hand-sketches in conventional perspective of any of the ordinary joints used in woodwork, or any framed objects made in wood. The woodworking exercises are more difficult than those for the first year. A written examination is also held, and includes the place of origin, and the characteristic properties and uses of the commoner woods such as white deal (spruce), red pine (Scotch fir), yellow pine, oak, ash, elm, beech, mahogany, sycamore, teak, walnut, and bass-wood; the structure of timber trees, seasoning, shrinkage, warping, identification; the construction and mode of use of the various tools; the best methods of using nails, screws, and glue. It also includes fittings and cost of equipment of school workshops; arrangement of pupils; methods of instruction and sequence of lessons; systems

of manual training, as for example, Sloyd; general principles of teaching.

Metalwork.

In metalwork the course is a two years' one, but the class meets for three hours only on Saturday forenoons.

Fee, \$5.00, including examination fee, \$2.56.

Fees.

Each fee includes the use of tools and materials for the course, and also a class in Machine Drawing three evenings a week, which students are strongly advised to attend.

Students of the course must be teachers who have completed and passed the first year examination of the City and Guilds of London Institute, in manual training woodwork, or they must present themselves concurrently with their Metalwork Examination for the Drawing Examination for First Year's Woodwork and for a special Examination consisting of easy exercises in Practical Woodworking.

Admission.

The course for the First Year consists chiefly of practical exercises in metalwork, including vise work, bench work, and forge work, together with drawing in connection therewith.

Organization
of courses.

The course for the Second Year can be taken only by students who have passed the examination for the first year. It comprises exercises in the workshop, similar to, but more advanced than those of the first year, in which greater accuracy and finish are expected. The bench work includes brazing. Exercises are also set requiring the use of the lathe, including chasing, the use of the slide rest, and methods of screw cutting.

Students preparing for the Final Examination must attend a class in drawing unless they have done so in a previous session.

Instruction is given in making freehand dimensioned sketches, to plan and elevation, of hand and machine tools and other workshop fittings, and of exercises for practical work. The lectures on practical work include the discussion of the forms and angles of cutting tools as used for vise and bench work, and for lathes and drilling machines, together with the construction and use of these machines; the principle of working of gas and steam engines; arrangement of the fittings, pulleys, and belting; and the equipment of a school workshop and arrangement of lessons, etc.

Much importance is attached to the practical work, which receives at the examination four times the number of marks assigned to either of the other subjects.

Examinations.

The examinations in both woodwork and metalwork are both written and practical.

MUNICIPAL ART SCHOOL

GENERAL

- Aim.** The aim of the Municipal Art School is to give a practical knowledge of designing, drawing, painting, and modelling, more especially in the various forms of their ornamental application in association with architecture and technical conditions of manufacture, to assist those who desire a knowledge of Art as a part of their general education, and to give facilities to persons who intend to adopt Art as a profession, or to include it in their general qualification as teachers.
- The Museum.** An important adjunct of this School is a very fine museum which cost upwards of \$50,000, a sum derived from the profits of the Manchester Royal Jubilee Exhibition of 1887. It comprises three large rooms known respectively from the general character of their contents as the Textile Court, the Italian Court, and the Gothic Court, and in addition an East and West Corridor. Each room and corridor is equipped with objects of artistic skill and handicraft, either original or in fine reproductions, cartoons for stained glass, textiles of various kinds, a magnificent tapestry designed by Burne-Jones and executed by William Morris, examples of silverware, jewellery, majolica ware, pottery, porcelain, printing and book-binding, rugs, Turner's drawings (lent by the National Gallery), illustrations of Italian and Gothic ornamental and decorative art, etc.
- Fees.** The school provides both day and evening classes and the fees run from \$3 to \$35 a session, according to the number, length and character of each class. A special class has been provided for teachers on Saturday forenoon.
- Curriculum.** Class work is taken up in the following subjects:
- Model drawing, freehand drawing of ornament, perspective, geometrical drawing, blackboard drawing, light and shade, preparatory antique drawing, anatomy, principles of ornament, design and its technical applications, plants and their relation to design, historic ornament, furniture and interior decoration, figure composition, book illustration, writing and illumination, painting from still life, landscape painting, architecture, architectural design, drawing from life, modelling from life.
- The classes in art craftsmanship are as follows:
- Metal work, enamels, jewellery, repoussé work, stained glass, embroidery, wood carving, marble carving, architecture, decoration in plaster and stone, house painting and decoration, bookbinding.
- Exhib on of work.** At the time of my visit, an exhibition of work done by former pupils since leaving the school had been open for some time. The display was a remarkably excellent one, and the Principal informed me that amongst the exhibitors were pupils who had attained a high standing as artists and as industrial designers.

EVENING VOCATIONAL SCHOOLS

GENERAL

At convenient centres in many parts of the city the Education Committee has provided evening classes leading up to the more advanced technical classes in the Central Municipal School itself, and forming part of the Technical School system of the city. These classes afford instruction in general, art, and commercial subjects as well as in domestic science for girls and women. Before being advanced to the evening classes at the Central School, the student must be sixteen years of age and have had such a preparatory course as will enable him to take up properly the course he selects.

Distribution
and aim.

In order to ascertain to what extent the business firms of the City were co-operating with the Education Committee in the work of the evening schools, enquiry was made in 1908 in all departments, other than the Municipal Schools of Technology and Art, as to the number of students in attendance whose fees had been paid by their employers. The result was as follows:

Co-operation
of Business
Firms.

Thirty-five separate firms paid the fees of 173 employees. To encourage the co-operation of the employers, monthly reports were furnished the firms as to the attendance, progress and conduct of each student whose fees they paid. Monthly reports were also forwarded in respect to 192 students in the employment of 25 firms who had not paid the fees, but wanted to be informed of their progress. In several cases the advances of salary are dependent on this progress.

ORGANIZATION, DISTRIBUTION, AND ATTENDANCE

The statement below shows the general organization of the vocational courses in the Manchester School System. I give it in some detail as the organization should prove suggestive in the case of a large city like Toronto, in which the new Technical School should correspond to the Manchester Municipal School of Technology.

Preparatory Course—For boys and girls who desire to improve their general education or who are not sufficiently prepared to take advantage of the following courses.

Organization.

Grade I.—Continuation Schools:

1. First and second year Technical Courses for boys engaged in manual occupations.
2. First and second year Commercial Courses for boys and girls engaged in commercial or distributive occupations.

3. First and second year Domestic Courses for girls desirous of receiving a training in domestic subjects.

Grade II.—Branch Technical, Commercial, and Art Classes, and Schools of Domestic Economy:

1. Second, third, and fourth year Technical Courses, to meet the requirements of all classes of technical students.
2. Second, third, and fourth year Commercial Courses, to meet the requirements of juniors in business houses.
3. First and second year Art Courses leading up to the instruction at the Municipal School of Art.
4. Specialized instruction in Domestic subjects for women and girls over 16 years of age.

Grade III.—Central Institutions:

Municipal School of Technology—Advanced instruction in Science and Technology.

Municipal School of Commerce and Languages—Advanced instruction in Commercial Subjects and in Languages.

Municipal School of Art—Advanced instruction in Art and Design.

Municipal School of Domestic Economy and Cookery—Advanced instruction in Domestic Subjects. (Day classes only.)

Distribution.

The following statement for 1907-1908 shows the distribution throughout the city of the Evening Schools conducted by the Education Committee, outside of the Schools of Technology and Art:

Grade I. Evening Continuation Schools, 65 Departments. Lads' and Girls' Clubs (Associations for improvement), 5 Departments.

Grade II. Branch Technical Schools, 6 Departments. Branch Commercial Schools, 19 Departments. Evening Schools of Domestic Economy, 7 Departments.

Grade III. Municipal Evening School of Commerce, 1 Department. Central Evening School of Domestic Economy, 1 Department. Teachers' and Special Classes, 9 Departments.

Attendance.

The following statement shows the number of students enrolled in each department in 1907-1908, and is significant in view of the fact that the population of Manchester is about 650,000:

| | |
|--|--------|
| I. The Municipal School of Technology, Day Dept. | 661 |
| The Municipal School of Technology, Evening Dept. | 5,472 |
| Total attendance (some enrolled in more than one department) | 5,299 |
| II. The Municipal School of Art (Day and Evening Classes) | 755 |
| III. Continuation Schools (Evening): | |
| General | 6,603 |
| Commercial | 5,595 |
| Domestic Economy | 1,181 |
| Branch Technical Schools | 871 |
| Special and miscellaneous classes | 2,417 |
| Total attendance (Continuation Schools) .. | 16,667 |

In 1907-1908 162 students in the Day Department were enrolled as students of Victoria University, with a view to qualify for Bachelor of Technological Science or a Certificate of Technology.

CURRICULA

NOTE.—The numbers in brackets are the number of hours a week the class is held.

I. TWO YEARS' COURSES

First year:

Preparatory Course—Preparatory course for boys and girls who are too backward to take one of the following courses and who require instruction chiefly in the subjects of the Day School.

The pupils in this class, as a rule, receive instruction in reading, handwriting, and composition, the simple rules of arithmetic with or without the addition of one or two other subjects at the discretion of the Head Teacher. As the students will be of varying attainments, much of the teaching will necessarily be individual.

Technical Course for boys engaged in industrial pursuits—Experimental mathematics, including practical drawing and hand-sketching (3); woodwork (2); English (1).

Commercial Course for boys or girls engaged in commercial or distributive occupations—Commercial arithmetic (2); English (2); Geography (1); Bookkeeping or Shorthand (1).

Domestic Course for girls and young women in domestic economy subjects—English (1); arithmetic and household accounts (1); needlework and cutting-out (2); cookery (2).

Second year:

Technical Course for boys engaged in industrial pursuits—Experimental mathematics, including practical drawing and hand-sketching (3); practical mechanics and physics (2); English (1).

Commercial course for boys or girls engaged in commercial or distributive occupations—Commercial arithmetic (2); English (1); commercial correspondence and office routine (1); bookkeeping or shorthand (2).

Domestic course for girls and young women in domestic economy subjects—English (1); dressmaking (2); home nursing (1); cookery (2).

NOTE.—Where cookery cannot be taken, millinery may be substituted.

II. SIX YEARS' COURSES FOR TECHNICAL STUDENTS

First year—(Taken in Evening Continuation Schools)—Practical mathematics and practical drawing (3); woodwork (2); English (1).

Second year—(Taken in Evening Continuation Schools and Branch Technical Schools)—Practical mathematics and practical drawing (3); practical mechanics and physics (2) English; (1).

Third year—(Taken in Branch Technical Schools)—Engineering course—Machine construction (2); applied mechanics (theoretical and practical) ($2\frac{1}{2}$); experimental mathematics (2).

Building Trades Course—Building construction (2); applied mechanics (theoretical and practical) ($2\frac{1}{2}$); experimental mathematics (2).

Chemical Industries Course—Chemistry (theoretical and practical) ($2\frac{1}{2}$); physics (theoretical and practical) ($2\frac{1}{2}$); experimental mathematics (2).

Electrical Course—Magnetism and electricity (theoretical and practical) ($2\frac{1}{2}$); applied mechanics (theoretical and practical) ($2\frac{1}{2}$); experimental mathematics (2).

Fourth year—(Taken in Branch Technical Schools)—Engineering Course—Machine construction (2); applied mechanics (theoretical and practical) ($2\frac{1}{2}$); mathematics (1); geometry (1).

Building Trades Course—Building construction (2); applied mechanics (theoretical and practical) ($2\frac{1}{2}$); mathematics (1); geometry (1).

Chemical Industries Course—Chemistry (theoretical and practical) (5); physics (theoretical and practical) ($2\frac{1}{2}$).

Electrical Course—Magnetism and electricity (theoretical and practical) ($2\frac{1}{2}$); mathematics and geometry (2); machine construction (2).

Fifth and Sixth year—(Taken in the Municipal School of Technology)—Advanced instruction in Science and Technology.

III. SIX YEARS' COURSES FOR COMMERCIAL STUDENTS

First year: For all classes of commercial students—(Taken in Evening Continuation Schools)—Commercial arithmetic (2); English (2); geography (1); bookkeeping or shorthand (1).

Second year: For all classes—(Taken in Evening Continuation Schools)—Commercial arithmetic (2); English (1); commercial correspondence and office routine (1); bookkeeping and shorthand (2).

Third year—(Taken in branch Commercial Schools and Municipal Evening School of Commerce):

Shorthand clerks and typists—Correspondence, office routine and typewriting (2); shorthand (3); English (1).

Junior and invoice clerks—Commercial arithmetic (1); bookkeeping (2); shorthand (2); correspondence and office routine (1).

Bookkeepers—Commercial arithmetic (2); bookkeeping (2); correspondence and office routine (1); English (1).

Correspondence and shippers' clerks—A modern language (3); correspondence and office routine (1); commercial geography (1); bookkeeping or shorthand (1).

Fourth year—(Taken in branch Commercial Schools and Municipal Evening School of Commerce):—

Shorthand clerks and typists—Correspondence, office routine and typewriting (2); shorthand (3); English (1).

Junior and invoice clerks—Commercial arithmetic (1); bookkeeping (2); shorthand (2); correspondence and office routine (1).

Bookkeepers—Commercial arithmetic (1); bookkeeping (2); correspondence and office routine (2); English (1).

Correspondents and shippers' clerks—A modern language (3); correspondence and office routine (1); commercial geography (1); bookkeeping or shorthand (1).

Fifth year—(Taken in the Municipal Evening School of Commerce)—Diploma courses in accountancy, banking and economics, secretarial work, municipal work, higher commercial work, foreign trade and correspondence, and specialized instruction in commercial subjects and languages.

Sixth year—(Taken in the Municipal Evening School of Commerce)—Diploma courses in accountancy, banking and economics, secretarial work, municipal work, higher commercial work, foreign trade and correspondence, and specialized instruction in commercial subjects and languages.

LIVERPOOL

CENTRAL MUNICIPAL TECHNICAL SCHOOL

Like Manchester, Liverpool has a fine Central Municipal Technical School, which cost, I understand, about \$500,000. At this school the day attendance is very small. I should judge from what I saw that there are not more than thirty or forty who take advantage of these classes. The evening classes, however, are well attended, numbering about 1,500 pupils.

The system of organization is very similar to that of Manchester, and is the feature I gave most attention to at my visit. The Education Committee of the City has established a scheme of evening classes of three grades: Evening Continuation Schools, Branch Technical Schools, and Central Schools (Central Technical School, City School of Art, School of Commerce, etc.). Pupils are not admitted to the classes in higher grades until they are properly prepared.

EVENING CONTINUATION SCHOOLS

The Evening Continuation Schools provide courses of instruction for apprentices and youths engaged in trades, for juniors in business offices, for girls and young women who desire instruction in domestic subjects; as well as for those whose general education does not enable them to enter at once the more advanced classes. Of this grade there are twenty-five schools for males, eighteen for females, and four for males over 18 years of age.

The courses provided are as follows:

1. *A General and Literary Course*, extending over three years, for students wishing to continue their general education.

5 E.I.P.

2. *An Industrial Course*, extending over two years, for students who are engaged in or preparing for a trade of any kind of manual or industrial work.

3. *A Commercial Course*, extending over three years, for students engaged in offices, shops, warehouses, and other places as business clerks, cashiers, etc.

4. *A Domestic Course*, for girls and women, in subjects such as cookery, needlework, dressmaking, etc.

A Preliminary Course in reading, writing, arithmetic and similar elementary subjects is also provided for those whose education is not sufficiently advanced to enable them to take up one of the special courses.

Special Schools are also provided for deaf mutes and the blind.

In order to provide deserving students with an opportunity of continuing their education beyond the day school course without a break, the Committee offers every boy or girl on leaving the day school free tuition in an Evening Continuation School. In the case of good students this privilege may be renewed at the end of the year. A certificate at the close of the two years' course entitles the holder to admission at a reduced fee to the more advanced courses at the Branch Technical Schools or the Central Technical School. As the result of a competitive examination a grant for books or apparatus may be obtained in addition.

EVENING BRANCH TECHNICAL SCHOOLS

Aim. The evening Branch Technical Schools are intended for those who have completed the courses in the evening Continuation Schools, or who have otherwise prepared themselves. Pupils under sixteen are not admitted (except, in special cases, to an Art Class) unless they have completed the Evening Continuation School Course. Of this grade there are eight schools for males, and two for females, with two classes for males maintained by the Y. M. C. A.

Admission. The following courses are provided for, though all the courses mentioned are not taken at each school:

Organization. 1. *Commercial Subjects*—A two years' course in shorthand, book-keeping, correspondence, commercial arithmetic, business theory and practice, with commercial geography, etc., continuing the commercial course provided in the evening Continuation Schools.

2. *Building or Engineering Trades*—A two years' course for students engaged in various branches, comprising building construction or machine construction, practical geometry, and practical

mathematics, practical mechanics, etc., continuing the Industrial Course at the Evening Continuation Schools, and preparing students for the more advanced stages of the courses taken at the Central Technical School.

3. *General Trade Preparatory Course* for apprentices over sixteen, comprising practical drawing, workshop calculations, and woodwork or science, preparing students for the special trade classes.

4. *General Course* in English, mathematics, and general subjects.

5. *Modern Languages*—Classes in French, German, Spanish.

6. *Elementary Art Classes*, comprising geometry, drawing with pencil or brush, model drawing, shading, etc.

7. *Household Science Courses* in cookery, laundry work, home dressmaking, needlework, home millinery, home nursing, etc.

At some of the Branch Technical Schools special commercial Special courses, courses of an elementary character are provided; also afternoon classes in one or more domestic subjects (cookery, dressmaking, needlework and millinery).

The members of the staff are especially qualified in the respective subjects, and in many cases are employed during the day in commercial or professional work bearing on the subjects they teach. Qualifications of Staff.

As in the case of the Continuation Schools certificates Certificates. are granted to students who complete one of the courses extending over not less than two years. The holder of such certificate has preference in admission to the higher classes, and is in certain cases admitted at a reduced fee. Provision of the same character is made at the Branch Technical Schools for free tuition with or without a grant for books and materials.

CENTRAL TECHNICAL SCHOOL

The classes at the Central Technical School are intended for Aim. those who have completed the courses at the Evening Continuation and Branch Technical Schools, or elsewhere if their attainments are sufficient. As a rule students are not admitted under seventeen years of age.

In addition to the advanced courses for students in the Engi- Organization. neering and Building Trades there are also provided in the Central Technical School systematic courses of instruction of a practical character for electrical engineers and wiremen, in sheet, plate and bar metal trades; for carpenters and joiners; plumbers; house painters and decorators; and ironmongers' assistants.

Classes are also provided in the following subjects:

Lithography and process work; typography; bookbinding; brickwork and masonry; road carriage building; motor car engineering; cabinet-making; flour milling; breadmaking and confectionery; gas manufacture and gas supply; wheelwright's work; tailoring; artificial hair work (hairdressing and wig-making); telegraphy; telephony; builders' quantities; mathematics; plane and solid geometry; chemistry; physiology; hygiene; biology; botany; geology; mineralogy; sound, light, and heat; electricity and magnetism; mechanics, naval architecture.

Accommoda-
tions and
Equipment.

The school contains, in addition to the ordinary lecture rooms and class rooms, well-equipped laboratories for practical work in mechanical engineering; electrical engineering; chemistry and physics; special drawing rooms for machine drawing, builders' drawing, etc., and workshops in connection with many of the trades above mentioned.

Special
Classes.

Special Afternoon and Saturday Forenoon Classes in physiology and hygiene, drawing, mathematics, and practical laboratory work in chemistry and physics are arranged; as also Afternoon Classes (2.00 to 5.00 p.m.) for apprentice plumbers, painters and decorators, metal trades' apprentices, etc. At present only a small number of apprentices attend the afternoon classes. In 1910, the Director of Technical Education in Liverpool informs me, an afternoon class of mechanical engineering apprentices was formed for the first time. In most cases the students bring with them their time-sheets to be marked by the teacher, and thus the attendance, which is during the employers' time, is definitely recognized as part of their employment. Only the younger apprentices, during their first and second years, are let off to attend the afternoon classes.

Co-operation
with manu-
facturers.

Scholarships.

The Education Committee offers to students who have attended classes in the school for at least two sessions, and who have worked satisfactorily and obtained certain examination successes, valuable Senior City Technical Scholarships, giving free education at the Liverpool University for a period of three years, together with a money grant of \$250 per annum.

Nautical
College.

The classes of the Nautical College are held daily in the building of the Central Technical School in both the forenoon and the afternoon.

CITY SCHOOL OF ART

Aim.

The City School of Art provides in day and evening classes advanced instruction in art and artistic crafts. The building is much inferior to that of the Municipal Technical School, but it has very fair class-rooms and equipment. The curriculum includes the following subjects:

Accommoda-
tions and
Equipment.

Drawing, painting and modelling from the figure and antique; painting Curriculum.
from still life and flowers; drawing for book illustration and decoration;
design for manufactures and decoration; etching on copper, and mezzotint
engraving; artistic lithography; stained glass; enamelling; brass and copper
work; wood and stone carving; embroidery, etc.

A Branch School of Art is provided for in another part of the Branch School
City, under the supervision of the Principal of the City School of and Classes.
Art. As in the case of the other schools those who have attended
the Art Classes in the Branch Technical Schools may be admitted
free to all the Evening Classes. Art Classes are also provided at
the Central Technical School for students who are taking other
subjects there; also at five of the branch institutions.

CITY SCHOOL OF COMMERCE

The instruction given here is of a more advanced character
than may be obtained in the other schools of the scheme. The
school provides special afternoon classes in Modern Languages
for persons engaged in commercial offices.

DAY PREPARATORY TRADE SCHOOL

The Board of Education has also recently established a Day Aim.
Trade Preparatory School in the Toxteth Technical Institute. The
school is intended for boys who are preparing to become appren-
tices to the mechanical engineering, electrical engineering, sheet
metal, carpentry and joinery, building and other trades. As in
other schools of this class, the object of the training is to save
valuable time to both the boys and their employers during the
earlier years of their apprenticeship. The staff consists of teachers Staff.
who have themselves had practical workshop experience as well as
experience in teaching; and the Committee in charge has the con- Consultative
stant advice and co-operation of representative employers in the Committee.
arranging and supervising of the school course, and in securing
suitable situations for the graduates. The course is a full two Value of
years' one of practical training, and those who graduate find a course.
much readier entrance to the factories than those who leave the ele-
mentary school at fourteen to become office or errand boys, and
who quickly lose much of the value of the education which they
received at school, while learning nothing else that would help
them in their future. Moreover, such boys are in a better position
to derive benefit from attendance at the evening classes during
their apprenticeship.

The building has been specially erected for these classes, and Accommoda-
for use in the evenings as a Branch Technical School. It contains, tions and
in addition to the ordinary class-rooms and lecture-rooms, a special Equipment.

lecture-room and laboratory for experimental science, a workshop fitted with benches, lathes, etc., for woodwork, and another room fully equipped as an engineering workshop, drawing rooms, etc. There is also a large school playground and space for drill—a provision not often met with in cities of the size of Liverpool.

Admission tests.

For admission a boy must be not less than thirteen, and must pass an entrance examination in Arithmetic, Drawing (Freehand and Geometry), and English, equivalent to Standard VII. (Junior Form IV.).

Parents' pledge.

A noticeable provision, and one to be met with in many other of the English higher grade schools, is the requirement of a written statement from the boys' parents that it is their intention to keep him at the school for the whole course, and for him then to proceed to a trade or other industrial occupation. There are three terms each year with an entrance examination at the beginning of each, in August, November, and March. The fee, which is \$3.75 a term, covers the cost of apparatus, tools, materials, books and stationery used in the school, but pupils are required to purchase text-books, stationery, etc., required for home work. As in the case of the other classes, scholarships giving free admission have been established. The subjects of the course are as follows, the full course extending over two years:

Curriculum.

Workshop Practice in Wood and Metal. (Special importance is given to this section of the work, an average of eight hours per week being spent in the workshops.)

Practical Mathematics, including the application to workshop problems of Arithmetic, Mensuration, Algebra, Logarithms and Trigonometry.

Practical Drawing of Engineering, Building and other Details including constructive and solid Geometry.

Freehand Drawing—Sketching from Objects and Models.

Elementary Science, with practical work in the laboratory in Mechanics, Physics, and Chemistry.

English, including Reading and Composition, Geography, etc.

Physical Exercises.

DAY INDUSTRIAL SCHOOLS

Besides the Central Technical School, a Higher Elementary School, and some of the evening classes, I visited two or three of the Day Industrial Schools provided for poor and neglected children. In some cases these were really preparatory trade schools of an elementary character. While their accommodations and equipment were neither elaborate nor expensive, it was evident that

effective work was being done. Connected with one of these schools I found a wareroom in which were exposed for sale at current prices the articles the boys had made. The proceeds of the sale went towards the cost of maintenance. I may add that in another of these schools I saw the best physical exercises with dumbbells, clubs, etc., that I have ever seen in any primary or secondary school in the course of a long experience.

Disposal of
products.

Physical
exercises.

SCOTLAND

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SCOTLAND

INTRODUCTION

The system of education in Scotland I discussed with some of the officials at the Scotch Education Department in London, and in Edinburgh, where the Department has a representative. I will, however, confine myself to a brief account of the provision for technical education. As in England, this branch has made remarkable progress during the last few years. The standard of entrance to the technical and industrial schools has been greatly improved, the institutions are generally of a more practical character, and both the Imperial Government and the people have been more generous in their contributions. As in England and the United States, and indeed in Canada, an attempt was made at first to provide technical education by means of Mechanics' Institutes, but owing to the inherent defects of these institutes—chiefly the lecture system and the lack of adequate resources—their failure has been general. As in England, also, the London Exhibition of 1851 led to the establishment of the Science and Art Department through which grants were given on easy conditions as to equipment and staffs, but in connection with a strict system of examinations on technical subjects. Central institutions, as well as towns and villages, established systematic courses, but the instruction in science was academic, and only indirectly practical. Of late, however, the accommodation, equipment, courses of study, and methods of teaching are being related to the industries. Evening Continuation Schools have been provided by school boards to prepare for entrance into the technical colleges, and to supply courses of practical instruction that will improve the efficiency of those engaged in or preparing for the industries. Glasgow and Edinburgh in particular have been remarkable for their enterprise in providing a comprehensive system of technical education for these cities and the surrounding districts. As elsewhere this provision has been rendered necessary by the breaking down of the apprenticeship system. The Continuation Schools may be held not only in the evening but in the daytime, though as yet they are held usually in the evening; and they are open to all who have completed the obligatory courses of the elementary schools. In the agricultural districts I was informed that there are few of these classes as yet. By the Act of 1908 school boards have, however, the power to compel attendance both in the urban and in the rural schools, and the Department of Education is aiming at linking these Continuation Classes to the great central agricultural, technical, art and commercial colleges, of which eleven are already in existence:

Technical
education.

Mechanics
Institutes.

Science and
Art Depart-
ment.

Continuation
Schools.

Compulsory
attendance.

1. Aberdeen and North of Scotland College of Agriculture.
2. Aberdeen Gordon's College and Gray's School of Art.
3. Dundee Technical Institute.
4. Edinburgh and East of Scotland College of Agriculture.
5. Edinburgh Heriot-Watt College.
6. Glasgow and West of Scotland Technical College.
7. Glasgow Athenæum Commercial College.
8. Glasgow School of Art.
9. Leith Nautical College.
10. The West of Scotland Agricultural College (including Kilmarnock Dairy School).
11. Edinburgh College of Art.

Of the Scottish system the two most noteworthy features for my purposes are its scheme of Continuation School instruction and its provision for compulsory attendance thereat. I now submit a synopsis of the former and the sections of the Education Act that provide for the latter.

CONTINUATION SCHOOLS CODE

Organization. The code of regulations for Continuation Schools provides for four divisions:

1. Preparatory Classes for the Completion of General Education.
2. Elementary Classes for Specialized Instruction.
3. Advanced Classes for Specialized Instruction.
4. Auxiliary Classes.

Division 1. In Division 1, the classes are open to any pupils who are free from the obligation to attend the Elementary Day School. The subjects are as follows:

English, and one of the following courses: Commercial, Industrial, Household Management, Rural School Course. One of the following may be added: The Laws of Health, Money Matters (thrift, investment, insurance), Conditions of Trade and Employment, the Empire (its history, growth, and trade); the Colonies and the openings they offer for enterprise; Nature Study, Drill, and Singing; and any other subject specially arranged for by the Department.

Division 2. Division 2 comprises classes for elementary instruction in such special subjects as may be useful to pupils who are engaged in or preparing for any particular trade, occupation, or profession. Pupils may be admitted at the discretion of the managers, provided due regard is had to their previous instruction in the elementary school and their fitness for work of Division II. The subjects are thus classified:

Commerical Subjects:—Commercial Arithmetic, Handwriting, Book-keeping, Shorthand, Commercial Correspondence, Business Procedure, Commercial Geography, the study of any language (including English), with a direct view to its use in business.

Art: Drawing and Modelling; Elementary Design.

Mathematics: Elementary Geometry, Algebra, Mensuration, Dynamics.

Science: The elementary study, Theoretical or Practical, of Physical or Natural Science, or any branch thereof.

Applied Mathematics and Science: (a) General—Practical Mathematics, including Technical Arithmetic, and the use of mathematical instruments and tables; mechanical drawing. (b) Special—The application of Mathematics and Science to specific industries. Machine Construction, Building Construction, Naval Architecture, Electrical Industries, Mining, Navigation, Agriculture, Horticulture, or any other industry the scientific principles underlying, which admit of systematic exposition.

Where the nature of the subject requires it, previous or concurrent study of Applied Mathematics and Science or of the related branch of Mathematics or of Science will be made a condition of taking any subject under the special course in Applied Mathematics and Science.

Handwork: Elementary instruction in the use of tools—woodwork, ironwork—with concurrent instruction in drawing to scale and the practice of such occupations as needlework, cookery, laundry work, dairy work, with accompanying explanations of processes. Ambulance work (practice and theory).

The regulations require that a time-table and syllabus be submitted for the consideration and approval of the Department and classes in each subject or group of related subjects must meet not less than one day a week for such length of Session as may be approved of by the Department. For cause this length may be reduced. Each meeting shall be not less than an hour and a half for practical subjects, and one hour for others.

Division 3 comprises organized courses of systematic instruction, arranged with a view to fitting students for the intelligent practice of particular crafts, industries, or occupations. Division 3.

Courses under this division must as a rule extend over three years, and must provide for such a minimum of instruction as may be proposed by the Managers and approved by the Department. Courses may be instituted under this Division to provide technical instruction suitable to any crafts, industries, or occupations, approved as suitable by the Department.

Such courses may be classified under the following heads:

Commercial and Literary Courses, Art and Art Crafts, Engineering (civil, mechanical, electrical, mining, sanitary, etc.), Naval Architecture, Navigation, Architecture, Building and Allied Trades, Textile Industries, Chemical Industries, Printing Processes, Women's Industries, Agriculture and Rural Industries, and other suitable industries or occupations not included under any of the above heads.

A preparatory year is provided, to which may be admitted Preparatory
year students who are over fifteen or who have had satisfactory pre-

vious instruction. Certificates are given at the end of each year's course. The classes must meet not less than twice a week for at least 20 weeks, each meeting to be for not less than an hour.

Equipment.

Provision for the industrial courses must be made in properly equipped laboratories or work shops for such amount of practical work on the part of the students as the Department may deem necessary, such practical work being illustrative of the principles taught and not merely of trade practices. Provision is also made for systematic instruction once a week in some period or branch of literature and history.

Literature
and History.

Division 4.

Division 4 comprises the following:

Physical exercises, military drill, vocal music, wood carving, fancy needlework, elocution (if taken in connection with an English course), or such other subjects as may be recognized by the Department.

Approval of
Department.

In all the divisions, the courses of instruction, the time-tables and the qualifications of the teachers are subject to the approval of the Department.

COMPULSORY ATTENDANCE ACT

The following are the subsections of the Scotch Education Act of 1908 referring to the compulsory school attendance of adolescents:

"(1) Without prejudice to any other power of a school board to provide instruction in continuation classes, it shall be the duty of a school board to make suitable provision of continuation classes for the further instruction of young persons above the age of fourteen years with reference to the crafts and industries practised in the district (including agriculture if so practised and the domestic arts), or to such other crafts and industries as the school board, with the consent of the Department, may select, and also for their instruction in the English language and literature, and in Gaelic-speaking districts, if the school board so resolve, in the Gaelic language and literature. It shall also be their duty to make provision for their instruction in the laws of health and to afford opportunity for suitable physical training.

"(2) If it is represented to the Department on the petition of not less than ten ratepayers of the district that a school board are persistently failing in their duty under the foregoing subsection, the Department shall cause inquiry to be made and call upon the board to institute such continuation classes as appear to the Department to be expedient, and, failing compliance, may withhold or reduce any of the grants in use to be made to the board.

"(3) It shall be lawful for a school board from time to time to make, vary, and revoke bylaws for requiring the attendance at continuation classes, until such age, not exceeding seventeen years, as may be specified in the bylaws, of young persons above the age of fourteen years within their district who are not otherwise receiving a suitable education, or are not specially exempted by the school board from the operation of the bylaws, and that at such times and for such periods as may in such bylaws be specified. Such bylaws may also require all persons within the district having in regular employment any young person to whom such bylaws apply, to notify the same to the board at times specified in the bylaws, with

particulars as to the hours during which the young person is employed by them:

Provided that no young person shall be required to attend a continuation class held beyond two miles measured along the nearest road from the residence of such young person.

"(4) This subsection provides for the application of the Public Health Act of Scotland.

"(5) If any person fails to notify the school board in terms of any such bylaw in regard to young persons employed by him, or knowingly employs a young person at any time when his attendance is by any such bylaw required at a continuation class, or for a number of hours which, when added to the time required under any such bylaw to be spent at a continuation class, causes the hours of employment and the time so spent, taken together, to exceed in any day or week, as the case may be, the period of employment permitted for such young person by any Act of Parliament, he shall be liable on summary conviction to a penalty not exceeding twenty shillings, or in case of a second or subsequent offence, whether relating to the same or another young person, not exceeding five pounds.

"(6) If any parent of a young person by wilful default, or by habitually neglecting to exercise due care, has conduced to the commission of an offence under the immediately preceding subsection or otherwise, through failure on the part of the young person to attend a continuation class as required in any such bylaw, he shall be liable on summary conviction to the like penalties as aforesaid."

EDINBURGH

HERIOT-WATT COLLEGE

GENERAL

One of the most comprehensive institutions in the British islands for the promotion of technical instruction is the Heriot-Watt College, Edinburgh, Scotland.

The Governors, who are elected by the City Council, School Board, the City Ministers, the University, the Royal Society of Edinburgh, and the Edinburgh Chamber of Commerce, are assisted in their duties by Advisory Committees representative of both employers and employees in the following trades: Printing, plumbing, commercial work, chemistry, engineering, building trades and mining.

The aim of the College is to supply, as far as practicable, for the industrial classes what the University gives to those preparing for the so-called learned professions. It claims to be the first institution in the British Isles founded for the express purpose of giving the industrial classes education in the principles of Science.

The diploma of the College is granted in the following departments: Civil engineering, mechanical engineering, electrical engineering.

eering, mining, weaving, architecture (conjointly with the School of Art), naval architecture, chemistry, metallurgy, mathematics and physics. Last session the attendance at the strictly evening technical classes was 3,000, and at the day classes 250.

DAY COLLEGE

Curricula. The courses of instruction in the Day College are arranged for mechanical and electrical engineers, mining engineers, manufacturing chemists, architects, printers, and publishers, and those who are interested in the study of technical mycology, such as brewers, distillers, margarine, butter and cheese makers, etc.

Connection with Industries. A striking feature of the college is the close connection between it and the various industries and trades in which instruction is given. The course in brewing, for example, includes apprenticeship in a brewery as well as the training in the College, and the students are also admitted for short periods to the famous Carlsberg Brewery at Copenhagen. Similarly, those who wish to be technical chemists are admitted free to the laboratories of the Corporation Gas Works for periods lasting from four to twelve months. The mining students not only obtain practical instruction in a mine in the neighbourhood of Edinburgh, but arrangements can always be made for from six to twelve months' instruction in metalliferous mines in different parts of England.

Connection with University of Edinburgh. The day classes are recognized by the University of Edinburgh. Students may, accordingly, proceed to take their B.Sc. degree in Engineering and in Chemistry by passing the necessary University examinations and attending certain additional classes in the University. Students who hold the B.Sc. degree can obtain at the College special post-graduate courses of instruction in technical mycology, analytical chemistry, electrical engineering and prime movers, with a special diploma therein.

Any further details of the day classes I omit, as being of a more advanced character than we are likely to have in Ontario outside of those of the Faculty of Applied Science.

Connection with College of Agriculture and Continuation Schools. The College is associated with the Edinburgh and East of Scotland College of Agriculture, and, what is of special importance to us in Ontario, with the Evening Continuation Classes of the Edinburgh School Board.

COLLEGE EVENING CLASSES

Admission to Evening classes at College. The conditions of admission to the evening classes at the College are a qualifying certificate from the Evening Continuation Classes or previous attendance at a secondary or Higher Elementary School, or passing an equivalent entrance examination.

The Evening Class Time Table shows 131 different subjects Curricula. in each of which a class is formed. Besides five years' courses under the general heads of mechanical engineering, electrical engineering, chemistry, mining, architecture, and sanitary science, the following, of special interest to us, are also provided:

COMMERCIAL CLASSES

The Junior Commercial Certificate is awarded to students who Certificates: have obtained either (1) Class certificates in the following subjects at the Evening Continuation Classes in commercial arithmetic, elementary English, elementary book-keeping and business procedure; or (2) Class certificates at the Heriot-Watt College in commercial arithmetic, elementary English, book-keeping, commercial correspondence, and précis-writing; or who possess qualifications equivalent to (1) or (2) and who, in addition to either of the above qualifications, have obtained in the Heriot-Watt College certificates in advanced English and advanced book-keeping and practice of commerce. 1. Junior.

The Senior Commercial Certificate is awarded to those who 2. Senior hold the Junior Commercial Certificate and who have obtained in the Heriot-Watt College First Class Certificates in the Practice of Commerce and Political Economy, and in two of the following subjects:—Principles of Accounting and Banking Law, Commercial Law, Commercial History, Actuarial Algebra, a fourth year Certificate in a modern foreign language, or an advanced Certificate in some other subject of study in the College which will be of value in the particular department of commerce which the student proposes to follow, but the selection of this subject must be made after consultation with the Principal.

TRADE CLASSES

In the Printing and allied trades ample provision has been Printing and Allied Trades. made for all kinds of practical work, including monotype and linotype machines. Apprentices are not admitted into these classes until the third year of their apprenticeship. They are expected to attend classes under the School Board for the first and second years of their apprenticeship. Classes are held for compositors, jobbing and display work hands, monotype and linotype hands, machine-men, bookbinders, and instruction is also given in photographic methods for book illustration.

The class in Carpentry and Joinery is intended for persons Carpentry and Joinery. who have previously attended the classes of Building Construction and Geometry, or have been through the course in Building Construction or Carpentry and Joinery provided in the Evening Schools of the School Board.

Masonry.

The work of the class in Masonry and Brickwork comprises lectures and drawing, and is intended not only for masons and bricklayers who intend becoming foremen or clerks of works, but also for architects, surveyors, and others who desire an intimate knowledge of building methods.

Other classes.

There are also classes for plumbers' work, watch and clock making, and tailor cutting; and in English literature and composition, elocution, theory of music, Latin, and Greek.

CONTINUATION SCHOOLS

Joint Schemes.

Joint schemes of work have been drawn up in conjunction with the Edinburgh School Board. In each course, the student receives instruction in the earlier stages at the Evening Continuation Classes of the School Board, and thereafter at the Heriot-Watt College and the Edinburgh College of Art. A special certificate is awarded to any student who completes satisfactorily any of the courses. The organization of these courses should prove suggestive to a large city like Toronto.

Certificates.

Courses.

The Continuation School subjects (other than elementary) have been grouped as English, commercial, technical and art courses for boys, young men, girls, and young women, and as domestic courses for girls and young women only. These specialized courses are taken up in different schools in various parts of the city. Summer Session Classes, lasting for a period of twelve weeks, are opened in three Centres, the subjects of instruction being those given during the Winter Session, and such others as then may be in demand. The fee for the Session is \$1.25 per subject, except in one school where the fee is 60c, but the fee is returned to all students who make 80 per cent. of the possible attendances. Pupils who enroll for one night a week only are expected to make 90 per cent. of the possible attendances.

Fees.

Organization.

The Continuation Classes are in five divisions as follows, the complementary classes being taken thereafter at the Evening Classes of the College:

Division 1.

Division I. *Preparatory Courses*.—These Courses are formed for the completion of general elementary education, and are especially intended for pupils who are over 14 years of age and who do not possess the qualifications for specialized instruction. Pupils must enroll for three evenings a week. Typical Preparatory Courses as taught in these schools are:—

(1) *Boys' Course*—English, including spelling and composition; arithmetic; and one or two of the following:—

Drawing (Geometrical and Freehand), the Empire (its growth, history and trade; the Colonies and openings for enterprise), civics, woodwork, common commercial documents.

(2) *Girls' Course*—English, including spelling and composition; arithmetic; and one or two of the following:—

Civics, the Empire, common commercial documents, laws of health, cookery, needlework, dressmaking, laundry work, millinery.

Division 2. *Specialized Courses*.—The following are eligible for admission: Pupils over 16, or pupils under 16 who have received a certificate of merit from the Day School or completed the Preparatory School course, or have been for at least one year at a Higher Grade or a Secondary School. Division 2.

The Courses are as follows:—

(1) English. Two years' attendance and satisfactory work qualifying for the third year in Heriot-Watt.

(2) Commercial Courses.

(a) Shorthand Course. A three years' course in English, shorthand and typewriting.

(b) General Commercial Course. A two years' course in two or more commercial subjects selected from commercial arithmetic, business procedure, elementary bookkeeping, shorthand, English, commercial geography, French, German, Esperanto.

Division 3. *Technical Courses*.—A preliminary training for the following trades: Engineering, metal, building, woodworking, furniture, printing, ink making, baking and confectionery. Two years' courses are offered in:— Division 3.

Elementary engineering (eight schools), elementary physics (two schools), constructional engineering (one school), elementary building construction (nine schools), plumbers' work (three schools), carpentry and joinery (two schools), cabinet-making (one school), printing (seven schools), baking and confectionery (one school).

Division 4. *Art Courses*.—A preliminary training for arts craftsmen and students, as designers, engravers, metal workers, house-painters, cabinet-makers, lithographers, stone carvers, wood carvers, sculptors, modellers, etc.:— Division 4.

(1) General Art Course (six schools).

(2) Wood Carving and Design.

(3) Modelling in copper and brass.

(4) Modelling in leather.

The last three subjects are each taught in one and the same school, and students in either of them must take the General Art course first. Three year courses in Art are provided, preparatory to the course in the Edinburgh School of Art with its workshops

for the teaching of drawing and painting, sculpture, architecture, and design, and the various Craft and Trade Processes.

Division 5.

Division 5. *Domestic Courses*.—Three years' courses.

These courses train girls and young women to discharge with intelligent interest the responsible practical duties of the home. Two or more of cookery, needlework, dressmaking, laundry work, housewifery, millinery, first aid, home nursing, hygiene, and temperance are taken as forming a complete course.

Other classes.

Besides the foregoing, classes are provided in civics, economics and industrial history. Auxiliary Classes are also held in physical exercises, swimming and life-saving, vocal music, wood carving, and elocution.

Information and Employment Bureau.

An educational information and employment bureau has been opened by the Edinburgh School Board for the purpose of giving information and advice as to education or employment to parents and pupils. The bureau is open all day, and on certain specified evenings to suit the convenience of parents who cannot call during the day.

As illustrative of the work done in the Continuation Classes of the Edinburgh School Board I submit the details of the courses in Civics, Economics, and Industrial History, and in Art. I submit also an outline of the complementary Evening Courses of the Edinburgh College of Art:

CURRICULA

CIVICS

The course in Civics has been framed to suit the capacity of those just leaving school. The older students find in the courses in Economics and Industrial History much that is of great value in relation to industrial knowledge and efficiency:

Nation and State: Representative Government, Parliament and People, Party Government, the Village and the Parish, the School, Poor Law Union, Boroughs and Counties, Public Health, Roads, Streets, Buildings, and Lands, Police and Justice. Central Government: The Crown, Parliament, the House of Lords, the House of Commons, Working of the Parliamentary Machine. Judicial System: Judges and Law Courts, Executive Government, Control of Education, Local Government, Trade, Agriculture, and Post-Office. Executive Government: Home Office, Colonial Office, India Office, Foreign Office, War Office, Admiralty, Treasury. Duties of Citizens in relation to Local and Central Government. The Empire: Relations to the Empire and to Foreign Countries. Industrial and Social Duties of the Citizen. Associations of Workers. The State and Labour.

ECONOMICS

General Course—First year:—

Production of wealth—Land, labour, capital, and organization. Exchange of wealth—(a) Value and price; (b) Money; (c) Value of commodities; (d) Value of money. Distribution of wealth—(a) Rent of Land; (b) Wages of labour; (c) Profits of capital; (d) Trades Unions, strikes, co-

operative societies. Foreign Commerce, Credit, and Taxation—(a) Foreign commerce; (b) Credit and its influences on prices; (c) Taxation.

Special Course—Second year: The study of the following texts:—

Adam Smith: *The Division of Labour*; Thomas Robert Malthus: *Principle of Population*; David Ricardo: *Theory of Rent*; John Stuart Mill: *Theory of Value*; John Elliott Cairnes and Thomas Edward Cliffe Leslie: *Economic Method*; Walter Bagehot: *The Money Market*; William Stanley Jevons: *Statistics*; Henry Fawcett and Arnold Toynbee: *Social Reform*.

INDUSTRIAL HISTORY

General Course—First Year: Before the Norman Conquest. The Manorial System. Service and commutation. Towns, and the beginnings of town life. The Exchequer. Money and accounts. England under the Edwards. National unity and commercial policy. The Black Death. Later developments of towns and guilds. Enclosures for sheep-farming. Progress of woollen industry. The mercantile system. Elizabeth's legislation. Trading companies, and beginnings of Colonial expansion. Survey of industries from 1600 to 1760. The rise of banking. Growth of Greater Britain—trade wars of the eighteenth century. Machinery and power. The Agrarian Revolution. Laissez-faire and State charity. Artisan. Pauper. Remedies by legislation. Modern conditions. Trade and the flag.

Special Course—Second Year: Advantages of combining the study of history and political economy. Population in 1760. Agriculture in 1760. Manufactures and trade in 1760. Decay of the Yeomanry. Condition of wage-earners in 1760. Mercantile system and Adam Smith. Chief features of the Revolution. Growth of pauperism. Malthus and the law of population. The wage-fund theory. Ricardo and the growth of rent. Theories of economic progress. Future of the working classes. Wages and natural law. Industry and democracy.

ART

General Courses.

First and Second Years:—

1. Drawing: Any suitable medium, such as pencil, chalk, charcoal, pen and ink, or colour.

The objects of study are: Natural forms, such as flowers and plants from nature, shells, etc.; common manufactured objects; casts of ornaments. The drawings of flowers and plants in outline. All other drawings in light and shade or in colour. Charcoal, or other black and white drawings, drawings in coloured chalks, or in water-colour on brown or other tinted paper. Wood carving and metal repoussé—for pupils who receive instruction in design.

2. Work with instruments.—A course of simple geometrical problems. The construction of simple geometric patterns. The construction of simple scales, and their use.

3. Lettering.—Construction of simple alphabets—Roman, block, italic.

4. Arithmetic and Mensuration.—The measurement of floors, walls, etc. The calculation of cost of tradesmen's work.

Wood Carving.

First year (elementary).—Tools: Selecting and putting in order, sharpening, etc. Chip carving. Elizabethan, Gothic borders, Celtic strap work, Gothic ornament.

The exercises consist mainly in making copies in soft wood from clearly-cut models of graduated difficulty.

The object of this initiatory practice is that the student may gain a knowledge of the tools, and the proper method of using and sharpening them, together with some mastery over the difficulties connected with the grain of the wood.

Second Year—Early English, incised carvings, Renaissance (German and French styles). In this second year, students' exercises are in hardwood, oak, walnut, etc., e.g., picture frames, portions of carved furniture, etc. Students of this grade work from drawings as well as from carved models.

Third Year (Renaissance).—Italian, Louis XV., high relief, modelling from cast, masks, bosses, grotesque and heavy ornament. Third year students who show sufficient capacity are aided in their endeavours to work out complete designs, such as fireplaces, church or household furniture, fittings, etc. In this case, making complete drawings, showing design, construction, and carving. As far as possible, even from the beginning, students are helped to develop such individuality as they may possess, consistent with the principles and necessities of good craftsmanship.

Three lantern lectures on history and design are given to the combined classes during the Session.

Design.

First Year: Freehand and geometrical drawing. Copying of good examples of ornament and design. Study of the principles of elementary design as illustrated in patterns, scrolls, borders, etc. Exercises in simple design, such as repeat patterns, filling of simple shapes, bordering, etc.

Second Year: Studies from designs in historic ornament, such as Celtic, Norman, Gothic, Greek and Roman, Old English, Italian Renaissance, etc. Drawing of flowers and foliage. Principles of design in relation to the various styles of ornament. Designing of panels, pilasters, and useful articles in historic styles.

Third Year: Analysis of ornament in relation to design. Introduction of natural history forms, including fish, birds, animals, also the human figure. The grotesque as seen in mediaeval ornament. Colour in design, its use, in harmony, contrast, and effect. Original work and motive. Modern design and "Applied Art."

Modelling in Copper, Brass and Leather.

Metal Workers: A course of instruction in designing, laying down on pitch block, cutting outline with tools, raising from back, relaying on pitch block, flattening background, punching, modelling design, lifting copper off block, cleaning, flattening again, and making ready for the making up of articles, oxidizing.

Leather Workers: A course of instruction in designing and planning, cutting with knife round the design and raising design, flattening background, filling the design from back in order to give it raised effect and to ensure that the design does not flatten again during the making up of the article, modelling and shading design similar to modelling in clay, reflattening and punching background, staining and tinting, polishing and finishing, trimming article and preparing for making up, making up article, modelling various designs, each flower having different modelling and colouring.

EVENING CLASSES OF THE EDINBURGH COLLEGE OF ART

Drawing and Painting: Life Class (men), Life Class (women), geometrical drawing, perspective, elementary drawing, drawing from the antique, anatomy, book illustration, etching.

Sculpture: Life Class (men), Life Class (women), special modelling design and ornament class for craftsmen, carving and pointing in marble and stone, wood carving class, figure design and composition class, anatomy class (modelling in the round), antique class, elementary modelling class.

Architecture: Course—Architecture (Gothic). Course—Architecture (Classic). Sketching ornament from cast. Lectures (Course I, Course II.).

Design: Elementary design, elementary design lecture, advanced, writing and illumination, embroidery, historic ornament lecture, cabinet making and furniture design, cabinet making and furniture design sketching class.

GLASGOW

THE GLASGOW AND WEST OF SCOTLAND TECHNICAL COLLEGE

GENERAL

The Glasgow and West of Scotland Technical College had its ^{Origin.} origin in Anderson College, founded in 1796 under the will of John Anderson, Professor of Natural Philosophy in the University of Glasgow. It is thus probably the oldest technical institution in the world; it is certainly the oldest in the United Kingdom. In 1886 Anderson College and a number of other institutions of a technical character were amalgamated to form this College, under a Board of Governors, representing all the institutions so amalgamated, as well as the Corporation of the City of Glasgow. The first prospectus, issued in 1796, made the following quaint declaration of its aim:—

"The chief design of this Institution is to offer to young gentlemen intended for the Arts, Manufacturing or Commerce an opportunity of obtaining such a portion of useful knowledge as will qualify them for the society to which their fortunes insure their admission which will throw light on the various processes of the Arts and enable them to bring them to perfection and which will serve to soothe and fill up in a rational and profitable manner those hours which everyone must find unemployed in business."

The policy thus set forth has been continuously and successfully ^{Advisory Committees.} adhered to for over a century and, in furtherance of its aim, the co-operation of the leading engineering and manufacturing firms of the district has been secured and advisory committees of experts have been appointed to represent every trade and industry with which the Institution is connected.

The work of the College is divided into two main departments —Day and Evening.

The Day Classes are arranged in Courses of Study extending ^{Day Department.} over three or four years. Each course leads to the Diploma and

Associateship of the College in one of the following Departments:— Civil, Mechanical, Mining, or Electrical Engineering; Naval Architecture; Chemistry; Metallurgy; Mathematics and Physics.

The Evening Classes are divided into two sections:

Evening
Department.

1. In one the instruction given is similar to that in the Day Classes, and its standard may be estimated from the fact that the roll for last session contained the names of 175 University graduates.

2. The other section is intended for apprentices and workmen, and instruction is given in the scientific principles upon which their respective trades are based.

Connection
with Uni-
versity, School of
Art, etc.

Associates of the College are admitted to the examinations for the degree of B.Sc. of the University of Glasgow after attendance during one academic year on not less than three University courses. The College is closely associated with the Glasgow School of Art and Courses of Study lead to a joint diploma. The incorporated Weaving, Dyeing, and Printing College of Glasgow has recently been amalgamated with this College.

Joint Com-
mittee of
College and
School Boards.

Arrangements have been made by a Joint Committee, representing the College and certain School Boards in the neighbouring counties, under which students connected with engineering and building trades attend the Continuation Classes of these Boards and follow the syllabuses of work approved by the Joint Committee with courses extending over two or three years.

Attendance.

Last session the students at the College were divided as follows: Day Students, 605; Evening Students, 4,621; a total of 5,226. They came from all parts of the United Kingdom, and all the manufacturing industries within a radius of twenty-five miles were represented on the roll.

Fees and
Scholarships.

For the Day Course the fees range from \$5.25 to \$21.00, with laboratory fees from \$10.50 a term to \$85.00 for the year. For the Evening Class the fees range from 37c. to \$2.50 with \$5.75 to \$7.50 for laboratory courses.

The Governors have established a number of scholarships of the value of \$125.00 to enable students who have attended the Evening Classes to continue their course in the Day Classes and obtain the College Diploma. The fees, and in some cases the railway fares of students attending from Ayrshire, Dunbartonshire, Lanarkshire, Renfrewshire, and Stirlingshire may be paid by the Technical Education Committees of these several Shires.

Resources and
Expenditure.

The annual expenditure of the College for maintenance is about \$150,000. The Government Grant amounts to about \$50,000; \$80,000 is derived from endowments and about \$32,500 from students' fees. Allan Glen School, which is under the same man-

agement, has a separate income of about \$40,000. A building and equipment fund of about \$1,850,000 has been raised for the College. The completed building is estimated to be worth \$2,000,000. What is specially remarkable about this fund is the fact that it was raised by subscription, thousands of citizens having subscribed in large and small sums. The building will ultimately consist of six large wings, and the total floor space will amount to over seven acres. Even at present it is the largest single building in the United Kingdom devoted to educational purposes. Its equipment and accommodations are remarkably fine.

Accommodation and equipment.

DAY CLASSES

Students of 16 and over may enroll in any of the College classes on satisfying the Head of the Department that they are able to take up the work. Students under 16 and all who desire the Diploma must pass an Entrance examination. The standard of this examination is that of the Leaving examination of the Scotch Education Department. For those who do not hold this certificate the subjects are:

Admission tests.

1. Obligatory—(a) English (grammar, composition, history of the English language and literature, history and geography); (b) Mathematics (algebra,—two unknowns, geometry,—three books, trigonometry).

2. Any two subjects selected from the following: Experimental Science, French, German, Spanish, Italian, Latin, Greek, and any other language of which three months' notice is given.

The Governors intend to make Experimental Science obligatory at an early date. At the examination, the candidate must furnish satisfactory evidence that his course of training has extended over a normal period of 450 hours, and he must submit his laboratory note-books for inspection. The examination will be based on the course indicated by the note-books, and will be both oral and written.

Experimental science.

Courses are provided in the following:

Courses.

Mathematics, natural philosophy, chemistry, technical chemistry, metallurgy, mechanics, engineering, drawing, civil engineering, motive power engineering, electrical engineering, mining and geology, architecture, bacteriology, music, school of bakery, textile school.

A large number of firms in Glasgow and the West of Scotland (76 in 1909) have arranged to allow a selected number of their apprentices facilities for carrying out a scheme of College study conjoined with practical work. The courses of study in engineering are held during the Winter Session of the College, and student apprentices are thus left free to spend the intervening summers in the works. Some of these firms are willing to recognize, wholly or partially, the time spent in College as part of the

Provision for apprentices.

apprenticeship period, but such recognition is contingent upon satisfactory reports being received from the College in each case.

EVENING CLASSES

Admission examination.

For admission to the Evening Classes all candidates, except those who have passed in mathematics for the Leaving certificate of the Scotch Education Department or who hold an approved certificate covering the ground of the Entrance examination; students of 21 years and over; and holders of a recognized certificate from any approved Continuation School, are required to pass an entrance examination in elementary mathematics, as follows:

Arithmetic: Vulgar and decimal fractions. Square root. Percentage. Logarithmic calculations with four figure tables.

Algebra: First four rules. Substitution. Equations of first degree in one and two unknowns. Easy factors. Easy fractions. Graphs.

Geometry: Triangle. Parallelogram. Circle. Mensuration of areas and solids.

Certificates.

Certificates are granted to students who take a three years' course in one of the following departments: Mechanical engineering, electrical engineering, civil engineering, mining engineering, naval architecture, building science, mathematics and physics.

A number of Bursaries of the value of \$125 enable students to continue their studies in the Day Classes and proceed to the College Diploma.

Railway fares and, in some cases, the fees of students resident in certain districts are paid by the Educational Committees of these districts.

The evening classes are as follows:

Mathematics, natural philosophy, chemistry, technical chemistry, metallurgy, mechanics, botany and bacteriology, zoology, physiology, music, engineering drawing, civil engineering, motive power engineering, electrical engineering, mining and geology, naval architecture, architecture and the building trades, plumbing, sheet metal work, bootmaking, printing and allied trades, watch and clock making, school of bakery, tailoring, weaving, etc., painting, decorating, boilermaking, etc.

EVENING CONTINUATION SCHOOLS AT GLASGOW AND OUTSIDE CENTRES

Except in the Trades departments, the courses of the Day and Evening Classes of the Technical College are too advanced to be of special interest in an investigation like the present one that concerns itself chiefly with Elementary industrial education. Following, however, I submit details of the Evening Continuation Classes in Science and Technology at Glasgow and outside centres.

ORGANIZATION

Evening Continuation Classes in science and technology, leading to courses in the Technical College, are conducted in Glasgow, Govan Parish, Maryhill, Shettleston, Cathcart, Shawlands, Barrhead, Scotstoun, Yoker, Clydebank, Dalmuir, Duntocher, Gavinburn, Helensburg, Greenock, Ayr, Cambuslang, Stirling, and Alloa.

Associated
School Boards.

A joint committee, composed of representatives of the College and of the School Boards of the above localities, control the management of the classes, which are graded as follows:—

Grades of
classes.

1. *Preparatory Classes*.—For students whose previous education does not enable them to take full advantage at once of the Elementary Technical Classes and for those who have had no instruction in laboratory work.

2. *Elementary Technical Classes*.—For those who desire to take the advanced classes in engineering, building construction, architecture, and naval architecture in the Technical College. The work is divided into two courses. The satisfactory completion of Course 2 qualifies students for admission to the Technical College without further examination.

3. *Advanced Technical Classes*.—By arrangement with the College, advanced classes equivalent to the first year College Course in Engineering Science are held in three schools. These qualify for admission to the second year College course without further examination.

4. *Trade Classes*.—For students who, having successfully completed Courses 1 and 2 of the Elementary Technical Classes, are unable or unwilling to take up the advanced work in the College or the advanced Technical Classes specified above and yet desire to obtain some knowledge of the principles underlying their work. Trade classes have been established for patternmakers and moulders, machinists and turners, fitters and millwrights, electrical instrument makers, carpenters and joiners, and masons and builders.

The fees of any students whose parents do not earn over \$6.50 per week are paid by the Marshall Trust.

Fees and
bursaries.

One hundred and seventy bursaries of the respective value of \$15 and \$12.50 are offered. The age of the candidates must not exceed 17 years.

PREPARATORY CLASSES

Arithmetic: Weights and measures; simple fractions; decimals; decimal approximations; metric system; lengths, areas, volumes, ratio, proportion.

Algebra: Definitions of signs and terms; G. C. M. and L. C. M. by inspection; fractions; simple equations, graphs.

Geometry: Use of instruments and ruler graduated in inches and tenths and in centimetres and millimetres; graduating of scales; accuracy of

drawing to scale; measurement of angles and lines; measurement of triangles, definitions of angles; parallel straight lines; circle; chords and tangents of the circle.

Practical Work in Laboratory: British and metric units of length and other comparisons; measuring rods; mean values; length of curved lines; measurement of cylinder and determination of the value of Pi. Units of area; measurement of square, rectangle, parallelogram; triangle and circle; irregular figures; units of volume; actual measurement of volume of cube; right prism, cylinder, pyramid, and cone; displacement method; use of measuring cylinder, etc.; the spring balance; experiments in movements, levers, etc.

Drawing: Freehand sketching of machinery details; plane geometry, study of the more simple geometrical solids; easy projections (isometric and orthographic).

ELEMENTARY AND ADVANCED TECHNICAL CLASSES

Mathematics: Course 1:

Arithmetic: Vulgar and decimal fractions; percentages; averages; contracted methods; areas; weights and volume; mental arithmetic; calculation of numerical values from simple formulæ; square root.

Algebra: Symbols; common rules; brackets; substitution; easy fractions; factors; easy equations of first degree in one unknown; plotting of points and the construction of simple graphs.

Mensuration: Simple plane and solid figures; exercises with special reference to the engineering and building trades, weights of building materials; surface of room.

Geometry: Forms of simple solids; straight lines and angles; symmetry of figures; isosceles triangle; construction of triangles; parallel straight lines; sum of angles of a triangle; problems of construction; Euclid I 47 by measurement and calculation, etc.

Mathematics: Course 2:

Arithmetic: Calculation from more difficult formulae; logarithms.

Algebra: More difficult factors; easy equations of the first degree in one and two unknowns. Construction of graphs deduced from experimental results in mechanics. The solution of simultaneous equation of the first degree.

Mensuration: Solids. Calculations of times for machine operations, prices, etc. Weights of materials; surface area and capacity of ships' coal bunkers, etc. Measurement of quantities from plans; measuring quantities and extending in schedule form.

Geometry: Problems of construction; geometric loci; practical exercises involving the measurement of actual models; relation between the linear, areal and cubical magnitudes of similar figures plane and solid; properties of circle deduced from Geometry; angles at the centre on equal tangents to circles. Intersection of two circles; angles in segment of a circle; areas; geometrical illustrations of equations; experimental evidence for the substance of Euclid, Books I. to III.

Engineering Drawing, Course I.—

Testing instruments, scales, co-ordinate planes, points, lines: Study of the simpler geometrical solids. Oblique sections. Development of surfaces. Freehand dimensioned sketches of machinery details. These sketches to be used for the purpose of making complete working drawings.

Engineering Drawing, Course II.—

Planes. Development of surfaces when cut by oblique planes. True shape of oblique sections through machinery details. Freehand dimensioned sketches.

Building Construction, Course I.—

Testing accuracy of instruments. Scales. Explanation of the 3 co-ordinate planes. Points. Lines. Simpler geometrical solids. Development of surfaces. Sections.

Brickwork and Masonry: Foundations. Clearing, damp proof course, dwarf walls, etc. Bonds. Brick partition walls. Formation of openings. Stone sills and lintels. Weathering, throating.

Carpentry: Details of joints. Centreing for arches. Wall plates. Joisting and flooring.

Roofs: Couple, collar, lean-to, king trusses up to (say) 30 feet span.

Roof Covering: Names and sizes of slates. Sheet-lead and methods of laying slates and sheet-lead.

Plumbing: Lead flashings, ridges, drips, gutters, joints for lead pipes.

Joinery: Joint details, mouldings, doors, window seat and cupboards. Kitchen fittings, strapping, lathing and plastering.

Building Construction, Course II.—

Planes. Development of surfaces. True shape of oblique sections through joinery details.

Brickwork and Masonry: Classification of walls. Compound walls. Jointing. Varieties of masonry. Face on stones. Preparation of zinc or wooden templates. Dressings. Cavity walls.

Ironwork: Proportion and pitch of rivets. Riveted joints. An ordinary iron or steel rooftruss with details of all joints.

Joinery: Fixing joiners' work, grounds, architraves, skirtings. Common long window-sashes and their cases. Casement windows. Glazing, corbelling. Bay and oriel windows. Entrance and vestibule door.

Sanitation, Drainage, etc.: Bathroom fittings. Drainage, sewer, connection. Soil, waste and ventilation pipes, water supply, hot water circulating arrangement.

Naval Architecture, Course I.—

Construction of wood ships. Early iron ships. Composite ships. Steel ships. Cargo hatchways. Wood decks. Bulkheads. Shellplating, arrangement of landings. Scribe board. Marking off rivet holes. Methods of bending and levelling frames. Battleships and armoured cruisers. Construction of sponsons and paddle-boxes. Methods of launching. In addition to the Geometry for Course I, Engineering-drawing students in Naval Architecture are given a course in drawing ship details.

Naval Architecture, Course II.—

Curves of moment. Curves of displacement.

Midship area. Determination of centre of buoyancy. Co-efficients of fineries. Transverse metacentres. Definition of trim. Effect of free water on initial stability. Stability of oil tank steamer with tanks partially filled. Centre of gravity of cargo. Bilged vessels. Structural design. Systems of framing. Rudders. Ships' specifications. Board of Trade requirements. Laying off. Expansion of stern plating. Drawing as in Course I.

TRADE CLASSES

Patternmaking and Moulding, Course I.—

Timber and tools, rules for contraction, use of prints, coreboxes, core-templates, coreplates, lifting straps. Ventilation of mould. Workshop drawing. Translation of drawing office drawing into a full sized drawing on the pattern board. Moulding sands and loam. Principles of moulding. Core making and drying, parting surfaces, gates, vents, risers.

Patternmaking and Moulding, Course II.—

Drawing and making of patterns. Drawing off and making spur wheels, level wheels and worm gearing. Patterns in plaster of Paris. Making of cores in boxes and with sweep boards. Green sand moulding. Venting and gating. Clamping and weighing. Plate moulding. Moulds in dry sand. Use of a propeller. Chills and chilled castings. Workshop conditions prevail throughout both courses. Patterns are made from actual work, shop drawings and castings made by each student.

Machinists and Turners.

Cutting speed and rate of feed, cutting angle, cutting face of tool, top and bottom rake, point of application of tool, influence of cutting, speed on cutting pressures, comparative resistance in different metals, principles of construction of machine tools, use of measuring instruments.

Fitters and Millwrights.

Types of prime movers, building in of seatings and chimneys, arrangements of flues, placing of machinery, lining of shafting, pulley transmission, calculations of horse power, speeds of belt and shafting, use of measuring instruments, gauges, blocks, surface plate, methods of preparing surfaces, filing, turning, drilling, shaping, melting and scraping.

Electrical Instrument Makers.

Drawing the common electrical instruments. Explanation of circuits. Use of vernier micrometer, co-efficient of expansion, conduction, convection and radiation, reflection, refraction, the prism, doubled curved lens, concave mirrors, magnetism and electricity, electrical units, statical electricity, voltaic electricity, electro-magnetism, galvanometers and resistances.

Carpenters and Joiners.

Tools, construction, mechanical principles, sharpening, cutting angles, practical bench work, joints, roofs, doors, windows, sashes and their cases with finishings, etc.

Masons and Builders.

Bonds, meeting walls, Glasgow sizes of brick openings, sills, methods of quarrying, machining, planing and sawing. Varieties of masonry. Compound walls. Stone arches and lintels, etc.

ART CLASSES

First Stage.—

Drawing: Natural forms. Light and shade: Manufactured objects and museum material. Painting: Ornament from the cast. Modelling: Studies of an analytical and explanatory nature made to a large scale.

Instruments: Scales and their construction, geometric patterns, objects in plan and elevation from actual measurement.

Second Stage.—

Light and Shade: (a) Manufactured and natural objects; (b) cast; (c) antique. Painting from nature; ornament and the antique. Modelling from nature, from ornament, and figure from the cast.

Instruments: (a) Technical geometry required in the student's trade; (b) geometry patterns; (c) objects from measurement in plan, elevation and section; (d) perspective.

Specialized Work: For students passing in the above courses.

(a) Lettering. (b) Museum studies: Adaptation of natural forms to ornamental purposes. (c) Work in the actual material from designs executed by the students.

ALLAN GLEN'S SCHOOL

Before 1876, Allan Glen's Institution, as it was first called, ^{Grade.} gave instruction free to about 50 boys, sons of tradesmen or of those engaged in industrial occupations. After that date it was organized as a high class secondary and technical institution for boys intended for industrial and commercial pursuits, and has long been known as one of the most efficient and successful of the Secondary Technical Schools in Scotland. In 1886, although in a separate building, it became a part of the Heriot-Watt Technical College, with separate staff and courses. The fees for each course run from \$3.75 (preliminary class) to \$10.50 (class 4). ^{Fees.} The School provides a training in science, art, and in workshop exercises. Greek is not taught. The courses are as follows:— ^{Courses.}

Preliminary Class—At eleven years of age the pupils receive special training in English, composition, arithmetic, drawing, manual instruction, and physical exercises.

Qualifying Class—At twelve years of age the course consists of Latin or French or German, English (including reading, writing, grammar, and composition), geography, history, drawing, arithmetic, geometry, geometrical drawing, elementary science, manual instruction, and physical exercises.

The subsequent courses are as follows:—

Class 1. Subjects of previous class continued, with the addition of algebra, practical plane and solid geometry, workshop drawing, chemistry and physics.

Class 2. More advanced work in drawing, practical plane and solid geometry, arithmetic, algebra, pure geometry, physics, chemistry, and manual instruction, English, history, geography, and one language—Latin or French or German.

Class 3. All subjects of Class 2 carried to a higher stage and a course in trigonometry added; individual work in the chemical and physical laboratories and in the workshop is specially stressed. At the same time the liberal culture associated with a training in language and literature is kept constantly in view.

Class 4. Members of this Class are expected to specialize in ^{Optional Courses.} Course (1) mechanical and electrical engineering, or in Course (2) chemistry.

The subjects of Course 1 are mathematics (pure and mixed), applied mechanics, steam and steam engine, physics, practical solid geometry, machine design, wood and metal work.

The subjects of Course 2 are inorganic chemistry (theoretical and practical) and organic, physics, mathematics, practical solid geometry.

Certain studies are taken by all, viz.: English and another language, practical solid geometry, physics, and drawing. ^{Obligatory courses.}

FRANCE

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FRANCE

INTRODUCTION

Education in France did not become an important factor of the national polity until the Revolution, when the general social upheaval made it easy for Napoleon I. to place national education in the hands of the State. Since then, however, the growth of the present highly centralized system of public instruction has been marked by many vicissitudes. At present all the schools, colleges, and universities for general and professional education, supported in whole or in part by the State, are under the Minister of Public Instruction and Fine Arts; the provision for special industrial and technical education is under the Ministers of Commerce, Public Works and Agriculture; and the great Technical Schools providing for the Military and Naval service are under their corresponding Ministers. In the general system, local control has been reduced to a minimum. The Minister has very large powers; he authorizes the establishment of educational institutions assisted by the State; nominates the highest officials, the appointments, however, being made by the President of the Republic; and he appoints either directly or indirectly the great body of the teachers, professors, and officers in the service. His authority is felt everywhere and is maintained by an elaborate system of machinery operated by a corps of directors and inspectors.

Besides public primary schools, there are in the State system secondary schools, divided into two classes, lycées and collèges. Until recently the former were entirely and directly under the control of the Minister of Public Instruction; but there are now a number of independent ones in receipt of a fixed sum from the State, which they administer as they please. All the collèges are of the same grade. The lycées are superior, those of Paris being of a higher grade than those in the provinces.

Owing largely to the recency of the establishment of a State system, the influence of the religious orders, and of national prejudices, especially in the matter of the education of girls, the number of private schools is very large. Moreover, the progress of education has in some respects been slow. It was not until 1882 that the law was passed which made primary education compulsory. Under this law, the pupil is free to leave school only when he has obtained "A certificate of Primary Studies"; that is, when he is about eleven or twelve years of age. While also, of late years, public opinion is reported to be in favour of compulsory education for a longer period, no legislative action has yet been taken.

TECHNICAL EDUCATION

Primary
Technical
Education.

Diversified in
character.

Growth and
character of
Industrial
Schools; State
and Private.

Manual
Schools of
Apprentice-
ship.

Present pro-
vision for
State Indus-
trial and
Technical
Education.

Although soon after the Revolution there was a movement in the direction of establishing classes for young people beyond the elementary school age, it was not until the last quarter of the nineteenth century that the State began to take an active interest in industrial education, nor until 1880 that primary technical instruction was for the first time placed on a definite basis. Before that date such provision as had been made for industrial education—and drawing and other elementary industrial schools had long been in existence—was the result of private initiative. As a consequence, to-day the industrial schools of France exist under a great variety of conditions and are of diversified characters. Some are wholly under control of the State; others are municipal, communal, departmental, or private, and receive grants from the State, which exercises some control through its inspectors; and many others again are maintained wholly by trade unions, employers' associations, religious orders, etc. The industrial schools, however, as a whole, constitute a fairly comprehensive system; and, as the range and amount of the State grants are continually increasing, these schools are coming more and more under the central control with a corresponding increase in their efficiency.

The abolition of the Guilds, in 1791, the organization of industrial associations, and the important part these associations played in founding vocational schools and inspiring State initiative, did much to promote the growth of various types of industrial institutions. Since 1900, indeed, special industrial schools—public and semi-public—have developed so rapidly that it is estimated that they now number over 5,000. From all I could learn, for I had no opportunity of visiting them, the schools on a private foundation are inferior to those controlled by the State. Their financial support is inadequate, and they are housed in poor buildings, with too often poor equipment and organization. The State schools on the contrary are generally well housed and well equipped and organized.

After 1880 the Apprenticeship Schools which had existed for many years under municipal management were incorporated in the system of primary education under the name of Manual Schools of Apprenticeship, and to these, other industrial schools were gradually assimilated, all becoming more and more practical in character.

COURSES FOR ADULTS AND APPRENTICES

Throughout the Republic there are at present schools for adolescents and adults. With a view to their adaptation to local necessities, great freedom is allowed in their establishment and manage-

ment. Any one may establish such a school, with the approval of the Mayor, the Prefect, and the Inspector. They are, however, not compulsory, and efforts to make them so up to 17 years of age have so far proved unsuccessful. Except in a few localities, the sexes are separate, and the classes are held in the evenings and in the buildings of the State schools. The chief sources of revenue of these schools are municipal grants and private benefactions. In some cases, indeed, the continuance of these schools is due, I was told, to the self-sacrifice of the teachers, who often give their services gratis and sometimes even provide the heating and the lighting. They belong to the Department of the Minister of Public Instruction, and at present these Continuation Schools, "Courses for Adults and Apprentices," as they are called collectively, are organized into three divisions:

1. For "illiterates." These, however, are poorly attended; for, Courses for Illiterates. elsewhere, the adult workman or workwoman feels humiliated when taking up the rudiments.
2. For those who have completed the course leading to the Certificate of Primary Studies, Complementary Courses. Complementary Courses, corresponding to those of the English Higher Elementary Schools. These are Continuation Schools proper, and give a general course, with other subjects having a vocational outlook, such as industrial drawing, arithmetic, English, German, bookkeeping, stenography, typewriting, agriculture, land surveying, hygiene, domestic science, needle work, etc.
3. For industrial workers in particular. This division includes Trade Schools and Technical Courses. Trade Schools of various kinds, held usually by day, as well as "Technical Courses." The latter provide instruction in industrial drawing, geometry, and elementary science, adapted to the needs of the various classes of artisans. They are conducted usually in the evenings, the special practical work being taken up often on Sundays in the shops of the Trade Schools.

Besides the State supported Trade Schools, there are over Other classes for apprentices. 5,000 classes for apprentices provided by various industrial and other organizations, such as, in Paris, the Society for Elementary Instruction and the Polytechnic Association; at Havre, the Popular Education Society; and, at Lyons, the Society of the Rhone for Industrial Instruction.

HIGHER TECHNICAL AND COMMERCIAL SCHOOLS

The higher technical and commercial institutions are under the Control and number. direct control of the Minister of Commerce and Industry, and number as follows:

The National Conservatory of Arts and Trades at Paris; probably the most important of the technical institutions, with its laboratories for advanced research and its industrial museum.

The Central School of Art and Manufactures at Paris, which prepares high class engineers.

4 National Schools of Arts and Trades; boarding schools, which prepare for positions as managers and directors of industries.

15 Higher Schools of Commerce.

16 Schools of Hydrography: These have been established at the principal ports for the instruction of sea captains.

4 National Trade Schools: These are each an association of schools, including the infant and primary school, with, at each stage, technical instruction, which, commencing as "Constructive Work" at the earliest age, advances through manual training to the end of the apprenticeship course. These schools were intended as models, but, owing chiefly to the tendency to segregate the industrial and the academic schools, they have had few imitators.

2 National Schools of Watchmaking.

1 Practical School of Basket-making.

1 Practical School of Commerce.

39 Practical Schools of Commerce and Industry for boys, and fourteen for girls; amongst the most important of the industrial schools, providing trade and commercial courses with general courses as well; and

15 High Class Special Trades Schools at Paris; seven for boys and eight for girls. The School of Physics and Industrial Chemistry for boys provides both elementary and advanced classes.

In connection with some of the foregoing schools, there are Industrial Drawing Schools, in which instruction is given in evening classes suitable for local industries.

Maintenance.

As in most other countries, the maintenance of the higher technical institutions is a charge upon the state. In Paris the whole cost of the Trade Schools is borne by the city. In other cities with populations over 150,000, the State and the cities together bear the cost. When the population is smaller, the greater part is borne by the State.

OTHER EDUCATIONAL AGENCIES

Technical Libraries.

Besides the regular schools, public and private, there are many other agencies in France for the advancement of education, both general and industrial. As now in Ontario, every public elementary school must have a library, maintained partly by the Government, partly by the municipalities. In France they are often also

maintained from private sources. As also in Ontario, there is a system of public libraries unconnected with the schools. As again in Ontario, neither of these systems is as yet satisfactorily developed. I refer to the library system of France chiefly to point out that in the large cities there are technical and special libraries. One in Paris, for example, contains industrial models and drawings as well as a large collection of works on industrial subjects. As will be seen later, provision of a similar character is made in both Switzerland and Germany. These facts have a significant bearing upon the recent action of the Ontario Public Libraries Department in providing technical works for the public libraries in our industrial centres—an action which, the Inspector tells me, has met with popular favour.

Besides the libraries, there are also very numerous private industrial associations and many of a denominational character for the advancement of both general and industrial education, which provide lectures and classes, and organize clubs. Many of these have existed since the end of the eighteenth century. The Polytechnic Association may be mentioned as a type of the best. It provides classes in typography, dressmaking, millinery, strength of materials, etc., and organizes visits to work-shops and museums. The centre of this Association is in Paris, with many affiliated branches in the provinces.

Private Industrial Institutions.

LOWER INDUSTRIAL SCHOOLS

The entrance qualification to the lower industrial schools is usually the Certificate of Primary Studies, which, as I have already stated, may be obtained at 11 or 12 years of age; but there are many exceptions to this statement. Usually, however, the trade education of the French begins at an earlier age than in other countries, with, the French claim, corresponding advantages. In Paris, for example, as will be pointed out later, the standard of admission varies, and pupils are admitted as the result of a competitive examination.

Admission tests to lower Industrial Schools

As to the qualification of teachers: As in England and elsewhere, it is not practicable at present to secure generally an adequate supply of expert teachers of the technical subjects. In cities like Paris a supply is usually available, but it is generally not so elsewhere. And, again, as elsewhere, this lack is the chief drawback to the progress of industrial training and the cause of the opposition of many of those who are most interested in the work.

Qualification of Teachers.

In most industrial schools no fees are charged residents, but fees are charged foreigners and French non-residents. In others, while no fees are charged, all the pupils except the indigent are

required to buy certain meals, for which a small charge is made. In many, a deposit is exacted to pay the cost of material and supplies, and as a guarantee against damage to school property. Scholarships are also provided for meritorious pupils, and free tuition for those who are unable to pay. The fees run all the way from \$1.00 a course to \$540 a year for the highest commercial courses. Sometimes also board and lodging are included in the fee.

Elementary
provision not
satisfactory.

Looked at from the point of view of statistics, the provision for industrial education appears to be extensive. There is no doubt, however, that the elementary courses are not regarded as generally satisfactory by many of the French themselves. The chief causes of this feeling are defects in the present courses of study, lack of properly qualified staffs, insufficient financial support, irregular attendance, and the early age (eleven) at which the Certificate of Primary Studies may be obtained. In France, I may add, as in Ontario, the compulsory attendance law is ineffective for want of adequate means of enforcing it. It is, however, altogether probable that, in France, trade competition will work the cure for these evils. No doubt in time adequate financial support for all branches of industrial education will be provided by the State, experts will take the place of academic teachers, improvement will be made in the courses; and, in view of the action of Switzerland and Germany in the matter of the compulsory education of adolescents, France will be compelled to adopt a similar measure.

Attitude of
French
workmen.

At first the French workmen did not regard the industrial schools with favour. Some found fault with them, because their products were not skilled workmen; others feared the formation thereby of a select class whose introduction into their ranks might lower the pay of the workmen trained in the "shops." These objections have largely now disappeared. Generally, indeed, the unions are represented on the Boards of Management of the Industrial Schools.

PARIS

ELEMENTARY INDUSTRIAL EDUCATION

The provision for industrial training in Paris, as well as in France generally, I discussed with officers of the Minister of Commerce and Industry, with some of the municipal officers of Paris, and with the Director of Elementary Instruction for the Department of the Seine.

In Paris, courses in Manual Training form part of the programme of the primary schools, and are compulsory for both boys and girls until they obtain the Certificate of Primary Studies. This is the Manual Training and Household Science of the Ontario Public Schools. Boys are familiarized with the use of the tools ordinarily used in wood and iron working, and girls are taught the elements of household science and of sewing in particular. While the courses are chiefly cultural, they are also a preparation for apprenticeship in both men's and women's trades.

The special vocational instruction, which forms part of the elementary school system, consists of Complementary Trade Courses; that is, Industrial Continuation Schools proper, for both boys and girls who hold the "certificate." Here both complete their elementary education, keeping in view as far as practicable their future employment.

The scheduled programme of studies is as follows, the number in brackets being the apportionment of time in hours to each subject:

For Boys: Morals ($\frac{3}{4}$); arithmetic and bookkeeping ($1\frac{3}{4}$); chemistry (2); civics ($\frac{3}{4}$); history and geography (2); French (3); gymnastics (1); physical science and technology ($2\frac{1}{2}$); industrial art (7); modelling ($2\frac{1}{4}$); geometrical drawing (2); manual work ($6\frac{1}{2}$); singing (1).

In the second year, drawing is increased to six hours, and the provision for manual work is $7\frac{1}{4}$ hours.

For Girls: Morals (1); French ($4\frac{1}{4}$); arithmetic ($2\frac{3}{4}$); history and geography ($2\frac{1}{2}$); accounts ($1\frac{1}{2}$); science (1); hygiene and domestic science ($\frac{3}{4}$); English (2); gymnastics ($\frac{1}{2}$); singing ($\frac{1}{2}$); drawing (8); cooking (4); millinery (2); lingerie (4).

Besides the foregoing, there are three courses intended especially for adults or adolescents. They are held in the evenings, usually between 7 and 8.30, from two to four times a week:

1. *Courses of Primary Instruction*—These are for workmen and workwomen, but have no special industrial aim. They pro-

Manual
Training.

Day Comple-
mentary Trade
Courses.

Evening
Courses for
Adults and
Adolescents.

Primary.

vide for the instruction of illiterates in the elements—reading, writing, and arithmetic; but, owing to the reluctance on the part of adults to take elementary subjects, the attendance is comparatively small.

Commercial.

2. *Commercial Courses*—These include arithmetic, bookkeeping, writing, commercial law, stenography, English, and French, and are intended specially for those who are engaged during the day as clerks in the various business houses.

Technical.

3. *Technical Courses*—These include geometry, industrial drawing, experimental science, and shop-work. There are also special classes in industrial drawing. The practical subjects are taken up on Sunday mornings in the work-shops of the day industrial schools.

Importance of
Technical
Courses.

These so-called Technical Courses are for apprentices and workmen who wish to improve their knowledge of the theory and practice of their different trades. The number and the size of these classes are increasing very rapidly, and it has been found necessary to divide them into sections according to the trades of the students. The results of these courses have been remarkable, and, in some quarters, they are more popular than are the trade schools. In general, also, they are looked upon with greater favour by the older workmen who are occasionally hostile to the trade schools, on the ground that they form an aristocracy of labour. For some time, also, I was informed, the employers, recognizing the value of the courses, have granted their apprentices some hours a week to attend special classes held during the daytime.

Maintenance.

The Technical Courses are wholly municipal; the State has nothing to do with either their organization or their management. Each student costs the city about \$10 a year. The teachers are chosen by competitive examination and are appointed by the Committees of Management.

Teachers.

In the evening classes the instruction is given by the teachers of the day schools or by special teachers who are paid according to the subjects they teach and the number of hours they give to the work.

MUNICIPAL TRADE SCHOOLS

GENERAL

The special industrial training of skilled workmen and workwomen Paris provides for, in her municipal Trade Schools, and on account of their general excellence and suggestive character, I give them prominence in my report.

Of Primary
Grade.

In the official list these schools are designated "Superior Primary Professional (Trade) Schools," being thus distinguished

from the Secondary Industrial, or Technical, Schools, as, for example, the Technical Schools of Arts and Trades, which prepare foremen, managers, and even engineers. To this statement, as will appear later, the Paris School of Industrial Physics and Chemistry is an exception. In Paris, again, the trade schools give apprentices a thorough training for a trade. In the Provinces, the term is often applied to industrial schools in which the practical work falls far short of the requirements of a proper trade education.

On all sides, the Paris Municipal Trade Schools are admitted to be of a high character, compared not only with the other trade schools of France, but with the trade schools of other countries. With one exception they are held in good buildings. The building and equipment of the Estienne School, for example, cost nearly \$250,000, without taking into account the cost of the site. All are well equipped, and the work done by the pupils is most remarkable for its artistic excellence. In this respect, indeed, these schools surpass any others I have seen elsewhere, and there can be no doubt that the eminent position Paris now holds in certain branches of the trade of the world is appreciably due to the artistic superiority of these and its other industrial schools.

Character of Instruction.

Accommodations and equipment.

Excellence of Work.

Owing to the inadequacy of the accommodations the number in attendance at these trade schools is limited. Pupils are admitted in small numbers once a year as the result of a competitive examination, and there are always many names on the waiting list. In one of his recent reports, the Director of Manual Training for the city states that, of about 15,000 boys who leave the Paris schools each year, only some three or four hundred are admitted to the trade schools.

Attendance limited.

The number of these schools is increased according as the necessary funds can be obtained from the municipality. In 1904, for example, the reports show 12 trade schools. At the date of my visit, this number had increased to 15.

The municipal trade schools are maintained entirely at the expense of the City of Paris. On the average, each pupil costs the city from \$160 to \$180 a year. The State, however, names the various officers—the directors (principals) and the professors (teachers), and even the concierge (door-keeper).

Maintenance.

The Trade Schools in Paris are conducted under a law passed in 1900, which provides as follows:

Provisions of Trade School Law of 1900.

1. That each school shall be conducted in accordance with a plan arranged by the City Council and approved of by the Prefect of the Seine under the authority of the Minister of Commerce.

2. That for each school there shall be appointed an advisory body as follows, with powers fixed by the Prefect after consideration of a report from the City Council:

The Prefect of the Seine or the Director of Education; a number of members of the Town Council; employers of labour selected by the Town Council with the approval of the Prefect; two representatives appointed by the Minister of Commerce, and the director or directress of the school, who is, however, to have no vote.

3. (1) That the director or directress shall be appointed by the Minister of Commerce from one of three applicants recommended by the City Council.

(2) That the appointment of all other members of the school staff shall be in the hands of the Prefect, after consideration of a report of the Director of Education, but that before the appointment of technical instructors is made, the advisory body must be consulted.

(3) That the Minister of Commerce shall lay down the conditions of appointment for instructors.

4. (1) That the salaries of the staff and increases therein shall be settled by a decree of the Prefect after a decision has been come to by the City Council, and—

(2) That the whole cost of the school shall be borne by the City Council.

Selection and
Qualifications
of Teachers.

The teachers of the industrial subjects are selected by means of a competitive examination, which tests their manual skill, their technical knowledge, and their teaching ability. The candidates who succeed are almost always workmen or workwomen of unusual technical skill and intellectual attainments. In the boys' trade schools, accordingly, master workmen take the technical subjects, and in the girls' women of a corresponding degree of expertness. In many cases the trade instructors are not required to keep order; a special teacher is sometimes provided for this purpose. They may also devote part of their time to the school and part to their trade, and they may teach at more than one school.

Examiners
and Examination.

The mode of selecting the teachers is worth noticing: Throughout the district bills are distributed, advertising the fact that an instructor is to be appointed and that an examination is to be held on a certain date. The examining body consists of the Director of the School, the Director of some other school, a representative of the Education Administrative Department, and a member of the Education Committee:

1. Candidates must be usually not less than thirty and not more than thirty-nine years of age. They are required to submit details as to the school they attended and how they were employed afterwards; also, to pass a medical examination.

2. Examination papers are set in arithmetic and geometry as applied to the trade; and on the materials used, the tools required, the method of setting about the work, and the processes of manufacture.

3. A practical demonstration—drawing to a small scale of a given exercise, execution in outline to size, with geometrical applications.

4. A detailed estimate of the design executed.

5. The carrying out a piece of work prescribed by the Committee.

6. An oral examination on the subjects under (2) above and the manufactures concerned.

Great stress is laid on the requirements of 3, 4 and 5.

The staff of each school usually consists of three branches:

Organization
of Staff.

1. Administrative Branch: The Director, an Accountant, a Storekeeper, a Secretary and Librarian, and a medical man (part time).

2. Teachers for general instruction.

3. Technical Branch: A superintendent, the technical teachers, a skilled mechanic in charge of the machinery.

All the schools are day schools, with scheduled programmes; but, in some, evening classes as well are provided for those whose time is occupied during the day. All are free to residents of Paris, and, in most, needy city pupils are supplied with clothes and with meals. The meals usually consist of a breakfast-luncheon about 11, and a light meal about 4; the charge at the boys' schools being about 11c. and at the girls' 7c. In the case of residents of the Department of the Seine, the communities in which they live are required to pay \$40 a year for each pupil. The fee for others, including foreigners, varies according to the course selected. Certain special provisions are mentioned further on as part of my description of the school concerned.

Maintenance
and Fees.

The examination for entrance is competitive, and is threefold in character—medical, written, and oral. Great stress is laid on drawing. Applicants with the Certificate of Primary Studies may compete when 12 years old; others at 13. In some of the schools a preparatory class has been established for special reasons. Some exceptional provisions for admission are mentioned further on in connection with each school. On the satisfactory completion of the courses certificates of apprenticeship are awarded. Each year prizes are also awarded.

Entrance
tests.

Certificates
and Prizes.

The products of the trade schools are sold, and orders are taken by certain schools, especially the girls'. The reasons assigned for this course are as follows:

Disposal of
school pro-
ducts.

In order that the apprenticeship may be completely provided for and may approach as nearly as possible to actual manufacturing conditions, the pupils work in materials of all sorts, even those that are high priced. In dressmaking, for example, the apprentices must be able to work in silk, satin, velvet, etc. If no orders were taken, such materials would be too costly for the school to provide. Besides, it is harder to fit a human being than a shop-dummy. Moreover, as improvements are continually being made in the trades, and especially as the fashions are constantly changing, the work of the school can in this way be kept up to date. The money received for the school products goes towards defraying the expense of the less costly material used in the courses. The schools, however, limit the orders they accept to those the execution of which suits the requirements of the courses.

Number and
character of
trade schools.

For boys there are seven Trade Schools, with an attendance of about 1,300; for girls, there are eight, with an attendance of about 2,200. They are all situated in different districts and differ considerably in character. It will be remembered, of course, that each is under a special committee of management. There are greater differences amongst the boys' schools than amongst the girls', owing to the greater variety of the trades. As the system presents many points that will prove suggestive to us, I submit below a synopsis of the most important features of some of the curricula.

TRADE SCHOOLS FOR BOYS

DIDEROT SCHOOL

Disappearance of
apprenticeship system.

As the result of a report in 1871 by the then Inspector-General of Education, the old apprenticeship system practically died in Paris in 1872, and the Diderot School was opened in 1873. Its establishment was strongly opposed, but it was successful from the first, and others were soon started. The annual expenditure is over \$30,000, one-third of which is the cost of material. The accommodations are excellent.

Maintenance.

Organization.

The school trains workers in light and heavy machinery and pattern making. It provides for an apprenticeship of three years in blacksmithing, metal turning, machine erecting, making instruments of precision, electrical work, pattern making, boiler making, carpentry and cabinet making, lock making, sanitary plumbing.

All the pupils in the mechanical and fitting courses are trained in the third year in practical electrical work. On the completion of the course and after examination, the successful pupil is given a certificate of apprenticeship.

In the first two years the daily instruction consists of five and a half hours' shop-work and three hours' class instruction; and, in the third, of seven hours' shop-work and two hours' class instruction; thus approximating closely to actual shop conditions.

Maintenance
grants.

Very needy pupils may be allowed \$60 a year by vote of the Municipal Council. The school is situated in a workingman's district and the expenses are reduced as much as possible.

SCHOOL OF INDUSTRIAL PHYSICS AND CHEMISTRY

Exceptional
features.

This school, although ranked as a trade school, has exceptional features. It provides instruction in physics and chemistry as applied to the industries, for young men who enter from the higher elementary schools, the lycées, colleges, etc. Here are prepared engineers and superintendents of laboratories, and provision is also made for the instruction of the higher grade of workmen. The building and equipment cost over \$80,000.

The applicant for admission must not be less than 16 and not more than 19 years of age. As in other schools, admission is by competitive examination. Here, however, it is both written and oral, as follows:

Written—Composition; a problem in each of arithmetic, algebra, plane geometry, geometry in space or analytical geometry, physics, chemistry, geometrical drawing.

Oral—Mathematics and cosmography, physics, chemistry, German or English, bookkeeping.

Not more than 30 regular students are admitted in each year of the course. When the laboratory accommodation permits, a few non-residents of Paris are admitted on payment of a monthly fee of \$10. Needy city students may receive a monthly allowance of from \$5 to \$10.

During the first three half years the students take the same course, theoretical and practical, in general scientific work, physics, chemistry, mechanics, industrial drawing, etc. They then continue in common the physics and chemistry as well as the practical work in electro-chemistry, but the laboratory work is separate. When the student's three years' course is completed and he has received his diploma, he may take a fourth year in the Research Laboratory with which the school is provided.

BOULLE SCHOOL

In the words of the prospectus: "The Boule School aims at training skilled workmen and expert artisans capable of maintaining the traditions of taste and the superiority of the specially Parisian industries in artistic furnishings." Here the pupils serve an apprenticeship, and at the same time receive superior primary instruction suitable to their chosen trade. The accommodations and equipment are very fine. The yearly cost for salaries is about \$30,000; for material, \$20,000.

The competitive entrance examination comprises three subjects: Dictation, two arithmetical problems, and drawing at sight from plaster cast. Special stress is placed upon the examination in drawing.

Candidates from the Department of the Seine are given the preference over those from the provinces, provided they reach the required standard at the examinations. Pupils from the provinces pay \$100 per year, and their families provide for them outside of school hours.

There are two divisions—Furniture Making and Metal Work. Each year the school admits 102 pupils—60 in the furniture and 42 in the metal work division. The total attendance is about 325.

Organization. The course is one of four years, and provides both theoretical and practical instruction. To supplement their theoretical studies pupils visit museums, palaces, factories, etc., where information of an æsthetic or industrial character is obtainable.

The theoretical instruction includes a review of primary subjects: Geometry; technology; industrial economy; history of art; art drawing; water-colour; modelling applied to furnishing; industrial drawing; designing in all its varied applications to the trades taught in the School.

Trades taught The practical instruction is given by master workmen who teach only the apprentices. The trades taught are:

1. *Furniture Making*: Cabinet-making, upholstery, carving (wood and stone), carpentering.

2. *Metal Work*: Chiselling (cast-finishing, carving, repoussé); mounting; engraving (steel, tableware, jewels); metal-turning.

At different periods the pupils receive practical directions regarding the trades allied to their own. Those of the furniture section (except the upholsterers) do some work in wood-turning; those in the metal work section have simple exercises in planing, fret-saw work, moulding in sand. All, without exception, take moulding in plaster.

Diplomas. Pupils who pass the final examinations receive a diploma and are allowed to take their tools with them. As a proof of the efficiency of this school, it is pointed out that many have obtained, in competitive examination, dispensation from military service, with the title of Art Craftsmen; others have received first prizes at exhibitions.

GERMAIN-PILON SCHOOL

Aim. The aim of this School is to train young men in drawing and modelling in their application to the various branches of industry, such as jewellery, iron-ware, table-ware, lighting fixtures, fabrics, wall-papers, china, pottery, etc. The course, however, does not deal with specialties. It is basal in character; so, that when the pupil leaves school he may choose the specialty that best suits his taste and aptitude and will be of most advantage to him. The annual expenditure is about \$12,000. The attendance is not large (over 100). There are both day and evening courses.

Maintenance.

The age of admission is 14, except with the "certificate," in which case it is 13. The entrance examination consists of geometrical and perspective drawing, the drawing of simple objects, and French composition. No meals are provided in this school.

Admission tests.

The evening classes are from 8 to 10 hours a week for apprentices and others at least 15 years old. For these classes no entrance examination is prescribed, and foreigners are admitted.

The day curriculum embraces classes in drawing and modelling, water-colours, mounting; practical geometry, line drawing and elementary architecture; light and shade, perspective, anatomy, history of art, decorative composition, application of the analysis of style, designing of furniture and fabrics, embroidery, and lace-making. Besides, pupils are required to use the library. In addition, each year a special course of twelve lessons is given in jewellery at the expense of the Syndicate Chamber of Patrons of the Jewellery Trade.

Day
Curriculum.

The course covers three years. There are no shops for practical work except modelling.

First Year:

Drawing from plaster cast, ornament and figure; modelling. The drawing and modelling are carried on under the eye of the teachers.

Geometrical drawing, geometry, architecture; water-colour painting of flowers and materials used in industry.

Six hours a week are allowed for home-study by the pupils; so that they may have an opportunity of continuing at home their general education.

Second and Third Years:

Modelling; practical modelling; drawing from the cast and living models; comparative anatomy; decorative composition and analysis of style in the different branches of art; cabinet-making; water-colour. In the second year, practice and theory of shading. Second and third years, perspective. History of Art, in second year. Furniture designing, two half years. Special course in jewellery, provided by the Syndicate Chamber of Patrons of the Jewellery Trade, twelve successive Wednesdays after Easter.

The pupils of the second and third years are obliged to use the library on Wednesdays under the supervision of the librarian.

The evening course consists of drawing, elementary and advanced; modelling, mounting, perspective, the analysis of styles and decorative composition, practical geometry, and anatomy.

Evening
Curriculum.

BERNARD-PALISSY SCHOOL

The accommodations of this school are very poor; but it is, I was informed, to be united with the Germain-Pilon School under the name of "The Municipal School of Art Applied to Industry," and to be housed in large and commodious quarters, for which purpose \$200,000 has been voted. The annual expenditure is about \$15,000.

Accommo-
dations.

Maintenance.

The aim of the school is the application of Art to Industry—to train skilled workmen in certain Art Industries, such as ceramics, carving in wood, marble, stone, ivory, decorative painting, designing for materials, textures, and wall papers.

Aim.

There are both day and evening courses. To be admitted to the former the applicant must be at least 13 years of age, and pass an

Admission
tests.

examination in simple perspective and geometrical drawing. To be admitted to the evening classes the applicant must be at least 14 years of age. Foreigners are not excluded.

In connection with the School there is also a Friendly Society of the Old Pupils.

Day
Curriculum.

The curriculum has two divisions:

1. *General instruction* in art; and
2. *Practical application* of this in the work-shop.

In the first year the pupils study drawing from plaster casts, art objects, or industrial products; modelling; geometry and linear drawing; water-colour drawing from plants and flowers.

In the following years are taken up, in graded succession, drawing from plaster casts and living models; modelling, comparative anatomy, water-colours, history of art, analysis of style, decorative designing, perspective, and theory of light and shade. These courses are given in the forenoon.

Beginning with the second year, the pupils are arranged in four classes for practical instruction, during the afternoon, in the application of art to industry, as follows:

1. *Ceramics*—manufacture and decoration.
2. *Carving*—wood, marble, stone, ivory, etc.
3. *Decorative painting* of all kinds.
4. *Designing* for materials, textures, papers.

The evening classes are for adults, and are given from 8 to 10 every evening except Saturday and Sunday.

Evening
Courses.

The evening courses comprise an elementary and an advanced course in drawing; and an elementary and an advanced course in modelling, analysis of styles and decorative designing, applied geometry, comparative anatomy.

School
Products.

All the products of the work-shops become the property of the city.

ESTIENNE SCHOOL

Maintenance.

This School gives a very comprehensive course in the arts and industries of book-making. The annual expenditure is about \$30,000 for salaries and over \$15,000 for material. It is the finest of the Trade Schools. As already stated, the initial cost was about \$250,000.

Admission
tests.

The competitive examination for entrance consists of the following subjects: Dictation, two problems in arithmetic, object drawing. The age is not less than 13 and not more than 16. The school also admits without examination special French pupils for an annual fee of \$80 for the first year, and of \$120 for the third or fourth. Foreigners pay \$200.

Fees.

The apprenticeship covers four years, or five if the pupil desires another year, and the courses prepare for fifteen different trades. In each trade the pupil is taught every kind of work that pertains thereto. The school hours are from 8.30 a.m. till 6 p.m. The instruction is both general and technical. Organization.

General course: This comprises French language, history and geography, elementary mathematics, physical and natural science applied to the arts and industries of book-making, history of art and of book-making, modelling, object drawing, line drawing and decorative composition, writing, gymnastics, military exercises. As far as practicable, each of the preceding is made to bear directly on the trades taught. General Course.

Technical course: This comprises printing, lithography, engraving, book-binding, and gilding in leather; and photographure, as follows: Type-founding, typographical composition, stereotyping and electrotyping, press work, lithographic drawing, stone engraving, lithographic writing, autography (complementary course for pupils in lithography; its object is to teach pupils to understand the models or drafts of architects, engineers, or builders), lithographic printing, engraving on wood, engraving in relief (on all metals), copper-plate engraving (graver, nitric acid, dry point), copper-plate printing, book-binding, gilding in leather, industrial photography (the various processes). Technical Course.

During the first four months, the pupil attends all the work-shops. He is then placed in the work-shop of the trade to which he wishes to belong. Except occasionally, pupils take up specially not more than one trade. The technical course occupies most of the pupil's time. Practical work.

DORIAN SCHOOL

In admitting to this school preference is given to orphans, the children of mechanics who have resided for 10 years or more in Paris. They must be, at entrance, at least 6½ years old and under 11 years. Children of poor or large families are taken also, on approval by the school authorities, and after passing a medical examination. No other entrance test is prescribed. The boarders are admitted by the Prefect on a vote of the Municipal Council after nomination by the "Committee of Patrons" of the School, which corresponds to the "After-care Committee" of the English Trade Schools. The pupils are sent away for the summer holidays to the seaside or on some educational excursion. Admission tests.

The pupils of the boarding-school, who by their thirteenth year fail to obtain the certificate of Primary Studies, are sent back to their families. The others take a one year's preparatory course, and then commence the regular three years' apprenticeship to their trade. The Boarding School.

"After-care"
Committees.

The School management exert themselves to secure places for good pupils. In this work they are assisted by members of the Committee of Patrons and by the Old Pupils' Friendly Society, which has its place of meeting at the school.

The Day
School.

Day-pupils are selected by competitive examination. Fifty new pupils enter each year, making a total of 150 for the three years of the course.

Admission
tests.

The competitive entrance examination consists of dictation, three problems in arithmetic, a question in plane geometry from the first two books, French composition on a technical subject of the primary course, free-hand sketching.

No fees.

The school is free to both boarders and day-pupils. The former are supplied with all instruments and materials for work; the latter receive the instruments as a loan. School supplies are free. Boarding pupils wear the prescribed school uniform, which the parents must furnish. All pupils take the mid-day meal at the school, the day-pupils being charged 10 cents a day. Luncheon allowances are made in the case of needy pupils.

The curriculum provides as follows:

Organization.

1 *Trades Section* for pupils of 13 years and older, possessing the certificate of Primary Studies.

2. *Primary classes* for children of 7 to 13 years.

The Trades Section provides instruction, both theoretical and practical, for highly skilled mechanics; turning, in all materials; carpentry; forge and artistic ironwork. Additional trades are provided for according to demand.

As stated above, the Trade Courses are both theoretical and practical. The theoretical are as follows:

Theoretical
Courses.

The Theoretical Courses are as follows:

Writing, French, history, industrial geography, accounts, industrial legislation and economy, arithmetic, algebra, geometry, descriptive geometry, theoretical and practical technology, mechanics, industrial electricity, industrial drawing, art drawing, modelling, decorative designing, singing, gymnastics.

The Technical Courses are as follows:

Technical
Courses.

Fitting: First year—The fitter's tools, manufacture and maintenance. Filing, punching, tracing. Turning.

Second year—Making of tools relating to the trade-engineer's tools and their use. Turning.

Third year—Making different parts of tools and machines. Tracing, rimming, cutting of taps, polishing-bits, drills. Tempering and rectification. Screw-cutting. Construction and mounting of machines. Running motors and workshop machines.

Metal Turning: First year—Simple turning and systematic work in metals. Punching, boring, etc. Practical application of methods.

Second year—Parallel turning. Simple threading. Forging and tempering. Construction of parts of machines, motors, etc. Bores. Interchangeable parts.

Third year—Construction of instruments of precision. Threading on the lathe. Rectification. Construction of fine tools. Reproduction on the lathe. Mounting and construction in series. Work at revolving lathe.

The third year pupils work at modern machines.

Forging, Locksmithing and Art Ironwork: First year—Exercises with hand-hammer and sledge-hammer. Rolling with lead. Working a forge. Heating a piece of iron to proper point for working. Forging of nails, pegs, etc. Hot punching, anvil work. Simple forge work. Soldering. Forging of metals drawn to given sizes. Making of fretwork, foliage, etc. Various fittings.

Second year—Hammer repoussé work, etc.; cutting out with borer, etc. Punching. Forging and tempering of fitter's tools, etc.; nuts, etc. Chasing, foliage work, etc. Forging by hand and stamp, of branches, leaves, etc. Forging of small machine parts. Frames and cases.

Third year—Making of large parts of machines. Balconies, railings, doors. Making in wrought iron of ornaments, etc.

Carpentering: First year—Tools, mounting and sharpening. Character of different woods. Cutting to sizes. Simple jointing. Putting together, trimming, tongue and groove, glueing. Polishing and smoothing. Making of simple objects (shelves, panels, frames, etc.). Rabbeting and moulding tools.

Second year—Various jointings. Jointed work, including moulded parts (table, bench, door-frame, door, etc.) Instruction of a general kind regarding mechanical tools and their use in carpentering.

Third year—Complicated jointing, curved work. Arches, veneering. Preparation of woods and selection of them for art work. Practical work at complex pieces, front doors, wainscoting, etc. Preparation of tracings for machine work.

Under the guidance of their instructors, pupils in the third year visit factories and see work being executed.

At the close of the third year of study, pupils undergo an examination, and a diploma of apprenticeship is given to those who are successful.

TRADE SCHOOLS FOR GIRLS

RUE DE POITOU SCHOOL

This school teaches girls a trade and continues their general education.

The competitive entrance examination is on the following subjects: Admission tests.

Dictation, two problems in arithmetic, composition, specimen of sewing and of ornamental drawing from the cast.

There are two divisions:

1. The General courses for all the pupils in the forenoon.
2. The Trade courses in the afternoon.

The apprenticeship lasts three years, except in the case of industrial drawing which lasts four.

General Courses.

General courses: These comprise morals and civics, French, arithmetic, elementary science applied to commerce and industry, history and geography, line and ornamental drawing, sewing, book-keeping.

Trade Courses.

Trade courses: These comprise commercial course (writing, book-keeping, elements of commercial law, English, stenography, typewriting), embroidery for dresses and furniture, millinery, dress-making, industrial drawing (drawing from the cast, from common objects, and from flowers and plants), geometrical drawing, water-colours, painting on china, enamel, etc., decorative composition, artistic anatomy, history of art.

JACQUARD SCHOOL

Aim.

To use the words of the syllabus: "This School trains expert work women capable of maintaining the traditions of taste and superiority of French industry." At the same time, pupils are taught the household work necessary to their trade. The period of apprenticeship is three years. Instruction is free to residents of Paris, and aid is given in certain approved cases to needy pupils.

Fees and maintenance.

The school is held only during the day-time. All, without exception, take their mid-day meal in the institution.

Admission Tests.

Candidates at the competitive entrance examination must be at least 13 years of age unless they hold the "Certificate of Primary Studies." The subjects are dictation, composition, two problems in arithmetic, a decorative drawing, a piece of sewing.

Two sets of courses of study are given:

1. General Courses (in the forenoon, from 8.30 to 11.30), and
2. Special Courses in the trade chosen (from 1 to 5.30 p.m.).

Courses in household work (cooking, ironing, and mending) are given all pupils throughout their apprenticeship.

General Courses.

General Courses: These include primary instruction, elements of book-keeping, drawing and water-colour, domestic economy, cutting and joining, sheath-making for embroiderers, English language.

Special Courses.

Special Courses: These include needle-work, corsets, underwear, millinery and dresses, straw hats, boys' costumes, etc.; embroidery for furniture and dress; artificial flowers and feathers.

Certificates.

A certificate of apprenticeship and a savings-bank pass-book are given to pupils at the end of their third year, when they have passed all the final examinations.

RUE DE D'ABBEVILLE SCHOOL

The pupils of this school are of a higher social class than in most of the other schools for girls, and, accordingly, prefer the commercial course. The annual expenditure is about \$25,000.

Maintenance

The school provides young girls with a theoretical and practical training in a trade, while completing their primary education and learning household management. The regular course of study covers three years, and consists of complementary and trade courses.

Aim.

The subjects of the competitive entrance examinations are dictation and writing, two problems in arithmetic, French composition on a simple subject, needlework, simple drawing from plaster cast or common objects.

Admission tests.

For students of painting the course is one of four years; for the commercial section, of two years.

Organization.

The courses require three hours of primary instruction, and five hours of instruction in the trade every day during the first and the second years; and one hour of primary instruction and seven hours of instruction in the trade during the third year.

The Complementary Courses are as follows:

Complementary Courses.

FIRST AND SECOND YEARS:

Morals and civics, French (orthography, composition, literature); commercial arithmetic (interest, accounts, etc.); elementary geometry; book-keeping; history (ancient, mediaeval, modern, contemporary, in outline); geography (general, France in detail); elements of physics, chemistry, natural history; domestic needlework; household management (in all three years the pupils take turns at cooking and housekeeping).

The Trade Courses are as follows:

Trade Courses.

Needlework: First year—All kinds of stitches used in work in linen, woollen goods and cloths; cutting (two hours a week); drawing from plaster cast, figure designing.

Second year—Children's clothes; graded garments; cutting out of waists, jackets, petticoats, etc.; drawing from plaster cast, figure drawing (two hours a week).

Third year—Custom dressmaking; invention of models; change of patterns according to style; cutting-out of all kinds; drawing of models and finished costumes; history of dress.

Painting: First year—Drawing; water-colours.

Second year—Drawing; water-colours; china painting; anatomy and perspective.

Third year—Drawing from nature; water-colour; painting on china and on fans; anatomy; perspective; history of art; original designing.

Fourth year—Continuation of third year work; painting on glass; enamelling; miniatures.

Corsets: First year—Stitches used in corset sewing, cording, edging, mounting of busts, stays, etc.

Second year—Whaleboning, making of simple corsets and children's waists.

Third year—Corsets to order, cutting and fitting.

Embroidery: First year—Different stitches used in embroidering; practice in double embroidery, beading, spangling, Richelieu embroidery.

Second year—Double shaded embroidery, rococo embroidery, ribbon embroidery, spiral embroidery, 18th century crochet, application of these processes to furniture, dress and original embroidery.

Third year—Studies in flowers, insects and birds from water-colours or nature. Cord embroidery, reversible embroidery, gold thread embroidery. Practical work on materials, and inlaid lace on materials—Patterns. Mechanism of the embroidering-machine.

A course in drawing is given twice a week to pupils of the second and third years.

Commercial Subjects: During two years of their studies, pupils take accounts and the various systems of book-keeping, commercial arithmetic, stenography (Prevost-Delaunay method), and typewriting, and English.

RUE GANNERON SCHOOL

The accommodations and equipment of this School are excellent.

Maintenance. The annual cost of maintenance is about \$20,000.

Aim—Admission tests.

Here girls are taught a trade as well as housekeeping. Admission takes place at the usual age. The subjects for the competitive entrance examination are spelling, arithmetic, composition, drawing, and sewing.

The courses last three years, with the exception of that for drawing and painting, which lasts four. They are divided into General and Trade courses, and the work in each is both theoretical and practical.

General Course.

General course: This extends over three years and is obligatory on all except those who have obtained the "certificate." It comprises: French, arithmetic, morals and civics, history and geography, elementary science, literature, bookkeeping, English, cutting out, gymnastics, singing, drawing, domestic economy (including cookery, taken up every day).

Trade Courses.

Trade Courses: Of these there are six: (1) Book-keeping, English, stenography and type-writing; (2) Industrial drawing, modelling, painting on glass; (3) Artificial flowers and feathers; (4) Embroidery for dresses and furniture; (5) Millinery; (6) Corset-making.

Management.

In the management of the School, the directress is assisted by a Committee of Patrons who act as examiners at the close of the courses.

Financial aid is given the needy, and savings bank books are presented along with the diploma.

RUE DUPERRÉ SCHOOL

This School trains industrial designers and art workers in the *Aim.* special lines open to women.

Pupils from other parts of France than the City or the Depart- *Fees.* ment of the Seine pay from \$20 to \$60, according to the courses of study taken.

All pupils are admitted only by competitive examination, *Admission tests.* which takes place in June. For admission to the Elementary Division the age conditions are the usual ones; for admission to the Upper Division the applicant must be at least 15 and not more than 20.

The School has two divisions, an Elementary and an Upper, each covering three years of study. In each of these divisions instruction is both theoretical and practical.

The courses in the Elementary Division are as follows:

Theoretical: French; morals and common law; history and geography; *Elementary* arithmetic; simple geometry; elements of the physical and natural sciences *Division.* (physics, chemistry, botany, zoology, physiology); elements of hygiene, domestic economy, technology, history of art, ornamental designing, applied geometrical drawing.

Practical: Sight drawing and modelling; geometrical drawing applied to industry; ornamental designing; execution of designs given in the theoretical course; elements of water-colour and India ink drawing. Reproduction of models given in the course on ornamental designing.

The courses in the Upper Division are as follows:

Theoretical: Oral courses and lectures on ornamental designing, architecture, history of art, comparative anatomy, applied hygiene, political *Upper* economy, labour legislation. Also technical courses having in view the *Division.* designing and execution of lace-work, embroidery, tapestry, jewelry, gold and silver work, cabinet-making, furniture, art iron-work, ceramics, stained glass, enamelling, work in leather, ivory, the application of the process of photography, stencilling, etc.

Practical: Ornamental designing; sight drawing and modelling from the antique and from nature; architectural drawing; designing of lace and embroidery; designing of jewellery, gold and silver work, art iron-work; designing of papers, hangings, etc. Execution of work in lace, embroidery, painting and water-colour drawing on paper, silk, glass, etc.; application of the processes of modelling, moulding, stamping, working in metal, horn, ivory, mother-of-pearl, fine woods, tinting of materials by various processes, engraving, style busts, etc., photography (enlarging, retouching of negatives, etc.).

OTHER TRADE AND TECHNICAL INSTITUTIONS

Besides the Municipal Trade Schools there are others established by private enterprise: these (for example, the Watchmaking School) are largely subsidized by the Municipal Council. There are

also two other technical institutions which deserve especial notice on account of the influence they have upon the trade of the Republic.

NATIONAL CONSERVATORY OF ARTS AND TRADES

This consists of a museum and of laboratories for original research in mechanics, physics, and chemistry, as applied to the various industries. It has no fixed course of study, but simply offers advantages to students who wish to investigate matters pertaining to industry or agriculture. Lectures are provided for from time to time by the Board of Management. Those who attend are already engaged in various industries, and select the courses that suit them. The lecturers are scientists of the very highest rank. The cost of maintenance is borne wholly by the State; and the Schools are open, free of charge, to all who care to attend. The Conservatory possesses a large library of general and technical works, and a collection of machinery, tools, drawings, etc., illustrative of the progress and present condition of the Arts and Crafts.

The influence of this institution on the development of French industry has been very great.

NATIONAL SCHOOL OF DECORATIVE ART

Admission is by competitive examination, and the conditions are similar to those of the Trade Schools. The candidate must submit a drawing in accordance with the course he may select. Both boys and girls are admitted, but the classes are separate. The classes are held in the forenoon, afternoon, and evening. Foreigners are admitted only at the request of their national representative in Paris. The courses are those of a high class art school: Figure, linear, geometrical and perspective drawing; shading, ornamental design; anatomy; architecture, ornamental composition; drawing and painting from natural objects; history of art and industries.

The artistic influence of this special Art School upon French industry has also been very great.

SWITZERLAND

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SWITZERLAND

INTRODUCTION

Under the Federal Constitution of 1874 education in Switzerland is obligatory, free, under the supervision of the cantons, and open to all, without distinction of creed. Each canton has, accordingly, its own educational system. But the Federal Government also has certain powers; it provides that until children are sixteen they shall not be engaged in factory and school work combined more than eleven hours a day, forbids their employment in factories until they are fifteen, prescribes military exercises for the schools, and examines all recruits for the army at twenty. The federal, cantonal, and communal authorities, however, work together in remarkable harmony for the advancement of education.

Each school system begins with the Kindergarten, or Mothers' School. Such schools, however, are confined to the cities, towns, and large villages; and, as in Ontario, their number is limited, there being only about 900 in a total of nearly 4,500 elementary schools.

At the Primary School, attendance is compulsory for from six to eight or nine years, but the requirements of such attendance vary and are adapted to the actual conditions of the agricultural and industrial communes respectively.

The Primary Schools are followed by Continuation Schools, with courses of from one to two or three years. In some cantons, attendance at the continuation schools is obligatory, in some it is optional, and in others the decision is left to the commune; but usually the courses are confined to the winter months and provide not more than six hours' instruction a week. They are held sometimes during the day and sometimes during the evening, and aim at a review and extension of the work done in the primary schools. In many cases the courses in these schools have a vocational outlook, which is becoming more marked from year to year. The primary school in most of the cantons is followed by a secondary school, by which name is known a higher branch of the primary school. Compulsory courses in algebra, technical drawing, and one foreign language are its distinctive characteristics.

Next come High Schools, or Middle Schools, which prepare for the universities or the higher vocational schools. These schools differ greatly in character in the different cantons. Their courses are not uniform as regards their length, the age at which they begin, or the dates of admission and the requirements for graduation. Moreover, some high schools, as, for

Scholars'
Homes.

example, those at Berne and Bâle, admit pupils who have completed only four years of the primary school course; others, as, for example, those at Zurich and St. Gall, prescribe a preparatory course of six years. Their comparatively small number—for there are only about 70 of them—is due to a peculiar feature of the Swiss system. Instead of establishing a large number of small high schools, the cantonal, or local, governments provide in connection with large and well-equipped high schools what are called “Scholars’ Homes.” These provide excellent board and lodgings for pupils living at a distance, and the cost is so moderate that even parents who are not well off are able to send their children.

INDUSTRIAL AND TECHNICAL EDUCATION

Federal law.

Federal
Grants.

Bases of
Grants.

Central
control.

The first attempt at industrial education was made about the beginning of the eighteenth century, and thereafter the number of schools kept increasing, though not very rapidly. Towards the close, however, of the nineteenth century, Switzerland began to depend more and more upon her manufacturing industries, and a law was passed by the Federal Assembly which gave the Federal Government power to develop industrial education by the establishment of new industrial schools and by assisting those already established. It also provided for federal grants, which, subject to the decision of the Federal Council, might reach a maximum of one-half of the total annual expenditure for this purpose by cantons, communes, corporations, and private individuals. In 1895, State subsidies were also extended to schools for teaching commercial subjects, and domestic science and trades to girls. The federal grant to the industrial schools is on the average one-third of the total cost of maintenance, but special grants are made wherever conditions justify them. These grants are conditional on suitable premises and class-rooms, satisfactory organization and results, satisfactory programme of study, submission of financial statements to the Federal Government, and both cantonal and federal inspection.

Technical and industrial education, provided or assisted by the Federal Government, is under the Federal Department of Commerce, Industry and Agriculture, with the exception of the Polytechnic School at Zurich, which, founded in 1854, is still under the Department of the Interior. In the cantons, this branch of education has come more and more under the control of the Department of National Economy; but in those cantons where there is no such Department, all the schools, including the technical schools, are under the control of the Department of Education.

Although opposed generally by employers of labour, a general apprenticeship law, subject to adoption by each canton, was passed on a referendum vote in 1906 by a decisive majority of the electorate of the Republic. Of this law nearly half of the cantons have availed themselves. It provides in detail for the protection of the employee. Under it every employer who teaches a trade or accepts boys and girls as apprentices, must allow at least four hours a week during the day-time for attendance at an industrial school. An apprentice is defined to be a man or woman who is learning a trade in a workshop or store (not including such unskilled employment as selling ribbons, etc.). To be admitted to a trade the future apprentice must have completed the course of the elementary school and be at least 14 years of age. To be admitted to a mercantile business the minimum age is 15. A definite written contract is signed by the employer, the parent or guardian, and the apprentice. The contract provides also that the employer shall look after the bodily and mental welfare of the apprentice, who must have ten hours' continuous rest and must not be called to work over-time until he is over sixteen. At the end of his term, the apprentice must pass an examination conducted by a Board appointed by the Government; and, if he fails, he may present himself again after a lapse of six months. The enforcement of the foregoing provisions is entrusted to the Minister of Commerce and Industry.

Compulsory
Apprentice-
ship Law.

The committees in charge of the trade schools are composed of the chairman or some other member of the local school committee and representatives of the various trades—employers and workmen—and of those who understand and take an interest in trade education.

Local control.

The labour organizations generally look with great favour upon the trade schools. They are continually asking for them, and desire that they shall be free. Indeed, so well disposed have they been that, recognizing the effects of unskilled competition with the skilled workmen of France and Germany, some of the trade unions have established such schools themselves, and maintain them out of their own funds, with the aid of a cantonal grant.

Attitude of
Labour
organizations.

More and more the expert (the engineer, the architect, the gardener, the painter, etc.), has charge of the industrial subjects. In the smaller centres of population where no trade teachers are available, the elementary or secondary school teachers still go on teaching arithmetic, technical drawing, mechanics, physics, etc.; but such teachers are fast being replaced by experts. At present also the State is endeavouring to give the men with practical experience some training in pedagogical method. In 1885, the De-

Qualification
of teachers.

Provision for
training.

partment of Industry and Agriculture established special classes for teachers in the Technicum at Winterthur to prepare them to teach technical work, especially drawing. Diplomas are granted each year on an examination. One-third of the expenditure is defrayed by the Federal Government and the classes receive encouragement in other ways. The professional training is of two kinds: practical men (engineers, architects, etc.) are trained as teachers, and teachers are taught the practical work of the various trades.

CLASSES OF SCHOOLS

The special provision for industrial and technical education is as follows:

Industrial Drawing Schools, Industrial Continuation Schools, Handicraft Schools and Trade Courses, Housekeeping and Domestic Science Schools, Trade and Apprentice Schools, Industrial Art Schools, Secondary Technical Schools, Technical Colleges, Industrial Museums.

Industrial
Drawing
Schools.

The Industrial Drawing Schools provide, for the smaller towns, classes in freehand and mechanical drawing, and in colour-work and designing.

Industrial
Continuation
Schools.

Of the Industrial Continuation Schools about 200 are for both men and women; they are a special class of the continuation schools already described. They provide for the different handicrafts and trades, and are compulsory in some cantons, optional in others. At first they were held in the evenings; but, since the new law for apprentices, they have been held generally in the daytime.

Handicraft
Schools and
Trade
Courses.

The Handicraft Schools and Trade Courses are of a higher grade than the preceding, and aim at extending the knowledge of those engaged in trade. The courses, which include work-shop training, cover from two to three years. The Arts and Crafts Schools at Zurich and Berne are examples.

Housekeeping
and Domestic
Science
Schools.

The Domestic Science Schools provide instruction for domestic servants as well as for future house mistresses. For the purpose of training teachers for these courses the Federal Government assists with grants three schools with courses of from six to eighteen months.

Trade and
Apprentice
Schools.

The Trade and Apprentice Schools provide a thorough training in trades for ambitious workmen, and are of a higher class than the Handicraft School and Trade Courses. The Silk Weaving School at Zurich and the watch-making school at Bienne are examples.

Industrial Art
Schools.

The object of the Industrial Art Schools, which are of a higher type than the Industrial Drawing Courses of the smaller towns, is to improve industrial workers, and especially designers on the art side

of their crafts. Of these there are only a few special schools—at Zurich, Berne, Geneva, and Bâle. Instruction in Applied Art is also a regular part of the course in the other industrial schools.

The Secondary Technical Schools are of a higher grade than any of the preceding and are intermediate between the ordinary trade school and the polytechnic. They are often called Technicums and correspond to the German institutions of the same name. The first Technicum in Switzerland was founded at Winterthur, near Berne. There are also Technicums at Geneva, Bienne, Burgdorf, and Fribourg, and a movement is on foot to establish one at Luzern. The Technicum I saw was at Bienne.

The chief of the Technical Colleges, and a famous college it is, is the Polytechnic at Zurich, maintained by the Federal Government.

Industrial Museums are provided in a few of the larger towns; as, for example, in Berne and Zurich. Such museums appear to me to be a most commendable feature of the system. They are intended to acquaint the teacher and general public with the suggestive features of the progress of industry and industrial education. They contain plans for school buildings, specimens of school furniture and other equipment, samples of industrial work, and a large collection of educational literature.

The minimum age for admission to the industrial schools is fourteen. In some schools no examination is required, but the applicant must show that he possesses at least an elementary education, and that, after a period of trial, he is able to go on with the work. For admission to a Technicum two years' or more previous practical trade work is usually required.

The fees run from \$2 a term to \$10 for residents of Switzerland; foreigners pay \$5 a month. In some localities the schools are free, foreigners paying \$10 a year. In others, including the commercial schools, special courses for foreigners are provided, costing about \$50 a year. Where the Swiss pupil is unable to pay, the fee is remitted, and scholarships are also provided.

GENERAL

To show the comprehensive view of education taken by the Swiss and the regard of the Government for the welfare of the people, I may add that in the municipal building, in which are now housed the Zurich Trade Schools, there are about a dozen suites of rooms, such as would be occupied by the poorer classes of the community. Each of these suites is completely furnished by manufacturers for about a month each in succession, with examples of their various productions of an artistic and economical character.

On the day of my visit, the rooms were crowded with men and women appraising the different articles of furniture. It appears evident that such exhibitions cannot but have an important and beneficial influence upon the character of the Swiss homes.

National ex-
penditure on
education.

Switzerland, with a population of 3,559,349 in 1908, expended on education \$15,860,000. Of this, the communes paid \$7,800,000; the cantons, \$6,840,000; and the Federal Government, \$1,220,000. Of the total sum, \$10,180,000 was expended on primary education; \$1,440,000 on secondary education; \$1,800,000 on vocational and continuation schools; \$1,200,000 on middle schools, and \$1,240,000 on universities.

Attendance at
Industrial
Schools.

The following statistics for 1908 show the extent to which the Swiss avail themselves of vocational education; the figures have, of course, increased considerably during the last two years.

Besides 2,470 compulsory and 237 voluntary Continuation Schools, providing for a general education and attended by both boys and girls, there were in 1908 special vocational schools, as follows:

I. For Primary Education—

328 Industrial and Drawing Schools, with 19,884 boys and 4,829 girls.

95 Commercial Schools, with 10,981 boys and 2,195 girls.

11 Agricultural Schools, with 221 pupils.

496 Schools for Domestic Science, with 12,704 girls.

II. For Secondary Education—

5 Technical Schools, with 2,010 pupils.

17 Industrial Schools, with 4,952 pupils.

16 Watchmakers and Mechanics Schools, with 1,236 pupils.

9 Textile Schools, with 546 pupils.

6 Woodworkers and allied trade schools, with 155 pupils.

32 Commercial High Schools, with 4,610 pupils.

13 Agricultural Schools, with 1,131 pupils.

47 Domestic Science Schools for women, with 7,466 students.

III. For Higher Education—

The Polytechnicum at Zurich has 2,519 students, 515 of whom are foreigners.

Five Cantonal Universities, three with four academic faculties and two with three.

BERNE

TRADE SCHOOLS

The Trade Schools at Berne, a city of about 70,000 inhabitants, were established by the municipality, and are under the supervision of the City Council which appoints the staff. The schools for boys are all in one fine building, owned by the city, and are supported by contributions from the municipality, the Canton, and the State, and by the income from the sale of work done in the schools. The object aimed at is to furnish a thorough training in a trade, to give further general practical and theoretical instruction to young artisans who have ended their apprenticeship, and in general to improve technical training by enabling the industries to keep pace with modern developments.

Establishment

For Boys.

There is also a school in a good building, newly erected, where girls are taught the usual trades for girls:—dressmaking, sewing, laundry work, etc.; and a school for Household Science where they are taught housekeeping, cookery, etc., in courses which last from three to six months.

For Girls.

The pupil must be at least fifteen years old, have a good elementary school education, and be physically fit. The entrance examinations required of all pupils are held at the beginning of March, and cover German, arithmetic (to decimal fractions and percentage), geometrical and free-hand drawing. The pupil is, however, definitely accepted only after a trial period of about four weeks.

Admission tests.

On entering, a definite contract is signed between the municipality and the pupil, in which the mutual obligations are carefully specified:

Contract between municipality and pupil.

The municipality, through its school staff, undertakes (1) the carrying out of the courses of instruction free of charge, (2) observation of the laws regarding accident insurance, and (3) reimbursement to the pupil for work done by him, according to a fixed wage-scale which is detailed below.

The pupil, on his part or through his guardians, engages to conform to discipline and make good any damages to school equipment.

Differences arising between pupils and the school are to be settled by reference to three arbitrators—one nominated by each party and the third (if needed) by the President of the Law Court in Berne.

The Board of Management is composed of a member of the State Government Board, a member of the City School Board, a

Board of Management.

supervising committee of sixteen persons (representing all the allied interests), and from three to six members of the teaching staff for each of the four departments.

The heads of the school are the Superintendent of Education for the Canton of Berne and the Superintendent of Education for the city.

**Curriculum
of Boys'
School.**

In the boys' trade school, which alone I visited, instruction is given in four divisions: Machinery, Cabinet-making, Iron-work, and Plumbing.

**Academic
subjects.**

The teaching of such academic subjects as history, geography, and civics is left to the evening schools; but, as is to be expected, this is not regarded as a satisfactory provision.

**Duration of
courses.**

For machinists the course is one of four years; for cabinet-makers, iron-workers, and plumbers, three years. Less time may be required in the case of those entering with higher qualifications. The school year lasts from April 15th to April 15th, with a holiday from Christmas to New Year, and two weeks' in the summer.

**Fees: pupils
paid for
work.**

Instruction is free, but the pupil supplies the necessary drawing instruments. On the other hand, he is paid for his work, the kind and quantity of which is assigned by the instructors, and the wage determined according to its quality. The money thus earned by the pupil averages as follows:—

For machinists, 5 cents per day in the second year, 10 cents in the third and 15 cents in the fourth; for cabinet-makers, iron-workers and plumbers, 5 cents per day in the second half of the first year, 10 cents in the second year and 15 cents in the third (or final) year.

**Disposal of
Products.**

The sale of the work is entrusted to the Trade Unions; but the manufacturers are not well disposed towards such competition.

**Special and
Continuation
Classes.**

The curriculum of the Trade School also offers Special Courses in the installation of gas and water, and Continuation Classes for plumbers and cabinet-makers who have already served an apprenticeship of at least three years.

**Admission
tests: fees.**

For admission to the Special courses in Gas and Water-fittings the applicant must have finished his apprenticeship. The fees are \$1 for entrance and \$20 for the course.

For admission to the Continuation Courses for plumbers and cabinet-makers, the applicant must have had a three years' apprenticeship. The admission fee for both is \$1, \$40 for the plumbers' course, and \$10 for the three months' term, and \$40 for the longer term of the cabinet-makers' courses.

**Revenue and
Expenditure.**

The revenue for the year 1908 amounted to \$34,893. Of the total revenue for the past few years, about one-half was the product of work done in the schools, the other half being made up of

the combined contributions of the Federal Government, the Canton, and the city, each one-third. Of the expenditure 41.2 per cent. was for salaries, 24 per cent. for raw material, and 12.8 per cent. for prizes and assistance to pupils.

The examinations are conducted by the State, and take place in the spring and the autumn. On the completion of one of the regular courses the student is granted a diploma. If, for a satisfactory reason, he withdraws before such completion, he is granted a certificate of attendance in which is stated the cause of his withdrawal. Examinations and Diplomas.

In 1908 the attendance was as follows: Machinists, 46; cabinet-makers, 26; iron-workers, 29; plumbers, 22; continuation classes, 6; total, 129. The final State examinations were taken by 35. Attendance.

The Trade School courses are as follows:

MACHINISTS

About four-fifths of the time is given to workshop practice.

FIRST YEAR.

Algebra: The first four fundamental operations with monomials and polynomials. Equations of the first degree with one unknown. Extraction of square root of decadal numbers. Equations of the first degree with more than one unknown.

Arithmetic: Review of fundamental operations with examples from actual work. Vulgar and decimal fractions applied. Measures, weights, currency, percentage and interest.

Business Exercises: Correspondence, Letter post and Parcel post, Money Orders, Reduction Orders, Banking, Railway traffic, Freight Bills, Accounts, Receipts, Promissory Notes.

Planimetry: Lines, angles, triangles, squares, polygons. The circle. Calculation of circumference and area of plane figures. Solution of practical problems.

Drafting: Theory of projection. Round, oval and three-edged flanges, octagonal matrices, construction of ellipse, oval, parabola, hyperbola, cycloid, spiral lines and their application in machinery. sketching of simple bodies in ground-plan and elevation. Detailed drawing of simple objects from models, with insertion of dimensions.

Free-hand Drawing: Sketching of simple machine parts from models in rectangular projection, with the insertion of measurements. Sketching of bodies in parallel perspective.

Workshop Instruction: Filing, turning, planing, forging, and tempering. Making of simple machine parts, etc.

SECOND YEAR.

Mechanics: The chief kinds of motion. Fundamental laws of inertia and re-action. Force. Acceleration. Mass. Bodies in motion. Independence of motions. Forces in a plane with different points of application. Statical moment couples.

Technology: Iron ores. Varieties of iron. Pig-iron, malleable iron. Action of foreign elements on pig-iron. Combustibles. Smelting-furnace. Iron-casting. Welding. Iron in fusion (Bessemer and Siemens-Martin processes).

Rolling-mill. Steam hammer. Hydraulic press. Steel. Preparation of pipes. Cast-iron pipes. Smelted pipes of various kinds. Seamless pipes. Forged and pressed pipes. Rolled pipes. Commercial forms of iron. Tin, copper, lead, zinc, aluminium.

Alloys,—of brass, bronze, aluminium.

Stereometry: Bodies. Calculation of surface and cubic content. Calculation of weights. Practical examples.

Drafting: Practice in drawing machine parts, such as wheels, couplings, etc.

Theory of Construction: Detailed study of rivets, screws, keys and pins, belt-pulleys, cog wheels and gearings.

Workshop Instruction: Preparation of parts for tool-machines, etc.

THIRD YEAR.

Mechanics: Parallel forces in space. Calculation of pressure. Centre of gravity. Equilibrium and stability of bodies. Guldini's law. Levers, rollers, barrel wheels. Inclined plane. Pin and screw.

Calculating: Cog wheels, gearing. Calculation of time in machine-work.

Bookkeeping: Aim, method and keeping of business books. A year's account and making out of balance. Exchange and business methods.

Drafting: Drafting of whole machines, e.g., for boring, planing, cutting, turning, etc., from prepared sketches.

Physics: (1) Heat—Expansion of solid, fluid, and gaseous bodies. Specific heat. Conduct and radiation of heat. Melting, steaming. Properties of vapours. Atmospheric precipitations.

(2) Light—Diffusion and velocity of light. Measurement of light. Reflection. Refraction. Decomposition of colours. Lenses. Photographing room. Projection apparatus. The eye. Optical instruments.

(3) Magnetism and electricity—The magnet. Magnetic induction, etc. Earth's magnetism. Conductors and non-conductors of electricity. Atmospheric electricity. Lightning-rods.

(4) Galvanism—Galvani's and Volta's experiments. Electric currents. Electro-magnetism, etc. Chemical re-actions. Action of heat and light. Wireless telegraphy. Telephone. Transformers. Municipal electrical plants.

Workshop Instruction: Devising and constructing of complete machines from original designs. Exact fitting of parts, etc.

CABINET-MAKERS, IRON-WORKERS, AND PLUMBERS

The courses are analogous in character and scope to that given above for machinists, the subjects prescribed and the importance attached to them being governed by the needs and the objects aimed at in the special trade.

SPECIAL COURSES

Gas: History of lighting, preparation of gas of various kinds. Application of illuminating gas. Municipal gas system. Gas mains and pipes. Connections. Gas plants. Meters, taps, regulators. Lamps and chandeliers. Burners. Street-lighting. Gas apparatus for cooking and heating. Gas apparatus for industrial purposes. Plans and estimates of gas fittings.

Workshop Instruction: Practical work in the handling of the various pipes, fittings, etc.

Water: Here the instruction is analogous in scope and kind to the above for gas. In each case, the theoretical instruction calls for four hours a week, with 52 hours a week for practical work in the shops. The term lasts six months.

CONTINUATION COURSES

Plumbing—Theoretical Instruction: Special drafting. Bookkeeping and calculating. Estimating.

Workshop Instruction: Preparation of models from designs made in the theoretical courses. Bathroom outfits. Ornamentation of buildings. Washing outfit, with work in copper. The preparation of some piece of artistic workmanship.

Cabinet-making: These courses are analogous to those for Plumbers, but specially adapted to cabinet-making. The instruction is both theoretical and practical, in terms of three, six or twelve months, to suit the qualifications of the applicant.

BIENNE

TECHNICUM

This, the Technicum of Western Switzerland, was founded in 1890 in Bienne, a town of about 20,000 inhabitants. In 1909, the school, which up till that time had been a local municipal institution, was taken over by the Federal Government.

The building is a very fine one, well situated and well equipped in all departments. Its cost was borne partly by the Federal Government and partly by the town. The Watchmakers' School is close by and the machine shops are at some distance.

The Board of Management is composed of (1) two trade specialists appointed by the Federal Government, (2) a representative of the Department of the Interior, (3) an Administrative Council of twelve persons prominent in their professions, and (4) five special committees for each of the departments taken up in the school, at the head of each of which stands one of the members of the Administrative Council.

The curriculum now provides for the following departments:

Watchmaking, Mechanics, Electricity, Architecture, Industrial Arts, Railways and Postal Service, Preparatory Course.

A novel feature of the School is its course for Railways and Post Offices, both of which services, with the exception of a few mountain railway lines, are owned by the Federal Government. The Railway and Postal departments of the School have a complete outfit in miniature of all the mechanical equipment that pertains thereto—rails, switches, signals, station houses, etc.

Grade.

In character, this Technicum is intermediate between the ordinary Trade School and the Polytechnic at Zurich. The course is a three years' one, theoretical in the main, but closely connected with practical work. The graduates become foremen or superintendents, whereas the pupils of the ordinary Trade School usually become artisans.

Admission tests.

To be admitted, students must have completed the pro-gymnasium course; that is, nine years' schooling, or have served as apprentices for two years. Entrance examinations are held for admission to the lowest form, or, if the applicant is sufficiently advanced, to the one next above. All pupils are recommended to begin with the lowest Form, and a preparatory course is also offered. A trial period of three months has to elapse before the applicant is finally accepted as a regular pupil.

Fees.

The fees: \$2.00 per month in watchmaking and mechanics, \$10.00 per half-year term in the other departments. Foreigners pay \$5.00 per month in Watchmaking and \$14.00 per term in the other subjects. In some branches \$1.00 per term is exacted for the use of materials, etc. Pupils who only hear lectures without taking part in practical work pay 40c. per term for each course of one hour a week, or not more than \$10.00 in all. Articles made by the pupils in the work-shops may be retained by them on payment of the cost of materials used.

Insurance.

Pupils are insured against accidents, half of the total premiums being paid by the school. According to the department and to the risks incurred, pupils contribute from 20 cents to \$1.20.

Examinations and Diplomas.

Public examinations are held at the end of each term, and diplomas are awarded.

Curricula.

The following are the courses; I give them in detail, owing to the importance of the grade of the school:

In Mechanics there are two divisions: an upper one for those qualifying for directors of works or foremen in construction shops; and a practical division for work in metals. In Electricity the organization is the same. The upper course in each case covers 6 or 7 terms, and the practical division 6 terms; a term being half a year:

I. MECHANICS**A. UPPER DIVISION****FIRST TERM.**

Native Language: Elocution, reading, business correspondence.

Foreign Language (French for German pupils and German for French pupils): Reading, oral exercises, etc.

English (optional courses): Reading, translation, conversation.

Arithmetic: Review of the four rules, fractions, metric system, proportion, interest, accounts, etc.

Algebra: Review, positive and negative quantities, equations of the first degree with one unknown.

Geometry: Plane geometry, equality and similarity, mensuration.

Physics: Mechanics of solid bodies.

Chemistry: Introduction, metalloids and their combinations.

Projection: Use of instruments, geometrical bodies in different positions, rotations, parallel perspective, etc.

Free-hand Drawing: Perspective, leaf-forms, ornaments from models, pen tracings, simple work in colours, drawing from plaster models.

Penmanship.

Workshop Practice.

SECOND TERM.

Native Language: Business correspondence, deeds, contracts, etc.

Foreign Language (French for German, German for French pupils): More advanced conversation, compositions, etc.

English (optional course): Conversation, business letters, etc.

Algebra: Powers, roots, logarithms, equations of first degree with several unknowns, equations of second degree with one unknown.

Geometry: Solid geometry, prism, pyramid, cylinder, cone, sphere, calculation of surface and volume, conic sections.

Physics: Mechanics of liquid and gaseous bodies, heat.

Chemistry: Metals and their combination, introduction to organic chemistry.

Descriptive Geometry. Machine Drafting. Workshop Practice.

THIRD TERM.

Language: Italian, reading, translation, elementary conversation.

Algebra: Review, equations of second degree with several unknowns, arithmetic and geometric progression, compound interest, theory of combinations.

Geometry: Trigonometry, solution of problems, etc.

Descriptive Geometry.

Physics: Optics, magnetism, electrostatics.

Mechanics: Statics of forces in a plane, theory of centre of gravity, stability, friction, etc.

Theory of Machines: Screws, couplings, rivets, chains, pulleys, etc., etc.

Technology: Malleability of materials, properties of materials used in machine construction.

Materials: Resistance, elasticity, etc.

Machine Construction. Sliding scale

FOURTH TERM.

Language: Italian (optional): More advanced work.

Algebra: Binomial theorem, complex numbers, equations of the third degree, problems.

Geometry: Analytical geometry of point, straight line and circle, theory of conic sections.

Physics: Electric currents, exercises, review.

Mechanics: Motion of the point, dynamics, rectilinear and curvilinear motion, dynamics of solid bodies, etc.

Theory of Machines: Calculation and construction of supports, cog-wheels, etc., transmission of power by belts and ropes, cranks, pistons, etc.

Technology: Work in metals as to their ductility, etc.

Graphic statics. Strength of materials. Construction of machines. Electrotechnical work. Workshop practice.

FIFTH TERM.

Mathematics: Differential and integral calculus.

Technical: Installation of heating plants. Theory of heat. Motors: Hydraulics, turbines, hydrometry, etc. Graphic Statics. Applied Geometry. Civil Engineering. Book-keeping by single and double entry. Theory of machines. Elevators and transporting machines. Practical work. Construction of machines. Electrotechnical work: Dynamos, etc. Chemistry: General review.

SIXTH TERM.

Mathematics: Application of differential and integral calculus to geometry and mechanics, etc.

Installation of Heating Plant: Transmission of heat, air, steam and water heating, ventilation, etc.

Motors: Steam-engines, gas and petroleum motors, etc.

Theory of Machines: Construction and trial of regulators.

General: Estimation of net cost, etc., industrial hygiene, factory laws, precautionary measures, etc.

Elevators and transporting machines for water and gas.

Construction of Machines. Practical work: Experiments with machines, etc.

Chemistry: Industrial chemistry, combustibles, chief metals and their combinations.

Kinematic geometry.

Electrotechnical work.

Workshop practice: Adapted to the needs of the individual pupil.

B. PRACTICAL DIVISION

(a) Theoretical Instruction

FIRST YEAR.

Native Language: Readings, Composition.

Foreign Language: German for French pupils, French for German.

Arithmetic: Fractions, proportion, percentage, interest, etc.

Algebra: Four operations with integrals and fractions, equations of first degree with one unknown, square root.

Geometry: Lines, angles, triangles, polygons, circles, similitude and equality, surfaces.

Physics: Mechanics of solid, liquid, and gaseous bodies.

Chemistry: Principal metalloids and their combinations.

Workshop Technology: Metals, fine tools.

Technical Drawing.

SECOND YEAR.

Native Language (optional): Practical, commercial, industrial.

Foreign Language: German for French pupils, French for German.

Algebra: Powers, roots, logarithms, equations of first degree with several unknowns, equations of second degree with one unknown.

Solid Geometry: Principal theorems, surface and volume.

Physics: Optics, heat, magnetism, electricity.

Workshop Technology: Materials, metallurgy, casting.

Machine Drawing: Sketches from models, colours, shading, etc.

THIRD YEAR.

Mathematics: Trigonometry—Principal formulæ, solution of triangles.

Mechanics: Composition of forces, lever, pulley, etc., practical and theoretical work.

Technology: Work in metals, tool machines.

Machine Drawing: Workshop designs on large scale, crayon drawings, heliographic reproductions.

Book-keeping.

(b) *Practical Work in the Apprentice Workshop*

FIRST YEAR.

Practical work in wood and metals; construction of many objects, such as geometrical bodies in wood and metal, saws, hammers, keys, etc.

SECOND YEAR.

Work at the lathe, tools, and machines, etc.; construction of various objects, planing and marking of marbles, rules, etc.

THIRD YEAR.

Continued work in mechanics and construction, with optional work in watchmaking, electricity, or physics, according to vocation in view.

II. ELECTRICITY

(a) *Upper Division*

For the first, second and third terms the courses are the same as above for Mechanics.

For the fourth term the course is the same as for the Mechanics, but with more detailed electro-technical work.

For the fifth term, the subjects down to Chemistry are the same as for Mechanics; then

Magnetism and Electro-magnetism: Laws of attraction and repulsion, magnetic bodies, circuits, resistance, induction, currents, etc.

Laboratory work.

Mountings: Theoretical and practical work.

Construction of Machines.

For the last two terms the courses are as follows:—

SIXTH TERM.

Motors and Mathematics, as above for Mechanics.

Electro-magnetism, electro-dynamics, induction, electro-statics, dynamos, etc.; installation of electric fittings.

Telegraph and telephone, electric clocks and signals.

Laboratory Work: Experiments with dynamo machines, etc.

Electric Railways: Calculation of size of machines, regulation of motors, etc.

Mounting Plant: Theory and practice. Drawing of electrical works. Theory of electric works.

Chemical Laboratory: Analyses, electro-chemistry

SEVENTH TERM.

Mathematics: Application of differential and integral calculus to geometry, mechanics and physics.

Installation of Works: Distribution of power and light, transformers, etc.

Plans for Electrical Outfits, etc.

Machines and Transformers with alternating currents: Generators, regulation of tension, friction, motors, etc.

Electrolysis. Electrotyping. Laboratory work in electricity. Drawing of electrotechnical machines, etc. Electric railways.

Laboratory work in chemistry.

(b) *Courses for Electric Fitters*

These are the same as above for Mechanics and Electricians to the end of the fourth term.

FIFTH TERM.

With electricians, the students take the courses in elevators and transportation machines (optional), theory of machines (optional), municipal works (optional), applied chemistry, motors, electric technique, magnetism and electro-magnetism, installation of works, laboratory works, fitting, theory and practice.

SIXTH TERM.

With Electricians, the students take the following:—

Electro-dynamics, telegraphing and telephoning, dynamos, installation, motors, electric railways, electro-technical works, fitting, construction, drawing, laboratory work, alternating currents.

III. WATCHMAKING

The subjects taken up are as follows, the courses being of two, three or four years:—

Native language, foreign language (optional), arithmetic, algebra, geometry, trigonometry, mathematics, physics, chemistry, cosmography, bookkeeping, theory of watchmaking, mechanics, theory of regulating, technical drawing, letter engraving, electrotechnics, practical work (about one-fourth of the whole time).

IV. ARCHITECTURE

The subjects taken up are as follows, the course being one of three years:—

Native language, foreign language, Italian (optional), arithmetic, algebra, geometry, trigonometry, physics, chemistry, calligraphy, geology and mineralogy, projection drawing, descriptive geometry, stone-cutting, freehand drawing, architectural drawing, theory of construction, study of styles, nature of materials, mechanics, statics and strength of materials, practical work, land surveying, direction of works, legislation and hygiene, electrotechnics, plans, book-keeping, perspective, modelling, wood joints, rural architecture, fire service, construction of machines, estimates, bridges and highways, embankments, hydraulic works, history of art and architecture, life-saving.

V. INDUSTRIAL ART

In this department there are two courses, as follows—a Preparatory course of two years and a Special one of two.

Preparatory Course: The subjects are:—

Freehand drawing, linear and projection drawing, light and shade, architectural drawing, ornaments and figures, study of styles, practical work.

NOTE.—The practical work (21 hours a week the first term and 10 the second) is taken up here.

Special Course: The subjects are:—

Perspective, professional drawing, theory of ornamental forms, drawing from nature, drawing from living models, anatomy, work in chased leather (optional), modelling, with, in addition, the subjects of the Preparatory Course, except freehand drawing, linear and projection drawing, and light and shade.

VI. ENGRAVING AND SCULPTURE

The subjects taken up are as follows, the course being one of four years:—

Freehand drawing, technical drawing, perspective, theory of ornamental forms, drawing from plaster casts, caligraphy, industrial art drawing, study of styles, modelling, chemistry, anatomy, drawing of plants, drawing from living models, work in chased leather (optional), engraving and sculpture.

NOTE.—To the practical work in Engraving and Sculpture more than half the time is devoted each week.

VII. RAILWAY DEPARTMENT

The subjects taken up are as follows, the course being one of two years:—

German (as native language), French (as native language), German (for French or Italian pupils), French (for German or Italian pupils), Italian (as foreign language), English (optional), geography, arithmetic, physics, chemistry, merchandise, caligraphy, stations and offices, signals, railway management, shipping, railway legislation, tariffs, service correspondence, telegraph service, practical work, practice in telegraphy, first aid, excursions in groups (about once a week).

VIII. POSTAL DEPARTMENT

The subjects taken up are as follows, the course being one of two years:—

German (as native language), French (as native language), German (for French or Italian pupils), French (for German or Italian pupils), political economy, arithmetic, algebra, physics, chemistry, caligraphy, service correspondence, telegraphing, other subjects allied to postal service.

IX. PREPARATORY COURSE

The subjects, which are taken up in one year, are as follows:—

German (as native language), French (as native language), German (for French or other pupils), French (for German or other pupils), arithmetic, algebra, geometry, technical drawing, caligraphy.

ZURICH

ARTS AND CRAFTS SCHOOLS

Provision for
Industrial
Education.

In Zurich industrial education is provided in the Arts and Crafts (or, Industrial Arts) School and in the Industrial Continuation Schools. I visited the former of these Schools, two of the evening Continuation Schools, and the famous Swiss National Museum. I may add that there is also a special silk weaving school of a high character; but, as we are not interested in this subject in Ontario, I did not visit it.

Accommoda-
tions.

At present the Arts and Crafts School is in temporary quarters, in the building of the National Museum. As, however, the part of this building now occupied by the school will soon be needed by the city, a new one is projected for the school, part of the cost of which will, it is expected, be met by the Canton and the Federation, as is often the case in Switzerland. This school has

Day Classes.

an attendance of about 500, 130 of whom are day pupils. The day classes are attended by apprentices and, after a four weeks' trial, by boys and girls of about seventeen who have completed the primary school course and submitted a satisfactory work in design and served an apprenticeship in a special trade. The courses are from two to three years, and are taught by well-educated experts. The curriculum includes bookbinding, lithography, printing, woodwork, metal work, jewellery, repoussé work, silk weaving, and art designing in various branches.

Evening
Classes.

Besides the day classes there are also evening classes attended by about 350 students.

Course for
Apprentices.

The regular course for apprentices covers three years. The conditions of admission are an elementary education and the minimum age of 14. For work satisfactorily done, the pupil is paid according to a fixed scale, and both staff and pupils are insured against accidents, one-half of the premium being paid by the city and the other half by the insured.

Maintenance.

The total yearly cost of the Arts and Crafts School and the Industrial Museum, which is connected therewith, is \$80,000, of which one-third is contributed by the Federation and most of the balance by the Canton.

OTHER DAY TRADE SCHOOLS

For joiners,
dressmakers,
etc.

The only other day trade schools are one for joiners and two for girls in dressmaking, household science, laundry work, etc. The students in attendance at the Work-shop Training School for joiners are of four classes: Apprentices, apprentices desiring ad-

vanced work, master journeymen and apprentices taking special courses, and pupils of the Arts and Crafts School desiring special practical work.

INDUSTRIAL CONTINUATION SCHOOLS

In the Industrial Continuation Schools which provide over 350 classes held at suitable centres, all on week days (chiefly in the evenings), except six classes on Sunday forenoons, there were in the summer term of 1909 over 3,000 students (both young men and young women) with about 150 teachers. The students attend from a great variety of industries; but, as far as possible, those in the same industry are taken together. When I visited Zurich these courses were about to be reorganized, the intention being to group them in four departments, each under a special head, and to adapt them better to the necessities of the trades.

Below I submit a synopsis of the courses. From this their character will be seen. They provide supplementary instruction directly connected with the industries. The preparatory course for apprentices in the postal, telegraph, and telephone service is a special school, although registered amongst the continuation schools and supervised by the same authorities. As a rule, the work taken up in the evening classes is more elementary than the corresponding work in the Arts and Crafts Schools; but the work in technical drawing is of an advanced character owing to the number of metal manufactories in the city and neighbourhood. A noticeable feature of the courses is the provision for the foreign languages. The language of the Swiss is, of course, chiefly French and German, with some Italian; but, as English and Italian are needed in commercial correspondence and in the trades, special attention is given these languages. Very many of the masons, for example, are Italians.

All of the industrial schools, including the Arts and Crafts School, are under the supervision of a special committee, consisting of architects, tradesmen, professors of science, and representatives of employers and trade unions, nominated by these bodies and appointed by the local school board, which is elected by general vote of the ratepayers every three years.

One-third of the cost of the Trade Schools, as well as of the Commercial, Agricultural and Domestic Science Schools is provided by Federal grants, not quite so much by the Canton, and the rest by the city.

Organization.

Character of Courses.

Board of Management.

Maintenance.

Curriculum.

Following is the curriculum of the Industrial Continuation Schools for 1909. The length of each class is given in hours in brackets:—

TRADE SCHOOLS

Seventy-four classes, including those for young women. With a few exceptions, these are week-day evening classes, there being only six on Sunday forenoons. The number of classes in each subject varies from two to six or seven.

German (2), French ($1\frac{1}{2}$), arithmetic and geometry (2), caligraphy ($1\frac{1}{2}$), roundhand ($1\frac{1}{2}$), freehand drawing (3), projection drawing (2).

SCHOOLS FOR CRAFTSMEN

1. *Preparatory Courses* for Apprentices in Postal, Telegraph, and Telephone Service. Forenoons and afternoons.

German (6), French (8), Italian (4), English (4), arithmetic (3), algebra (2), history (2), geography (4), chemistry (3), caligraphy (2), stenography (2), gymnastics (2).

2. A second class for the same students, with the same list of subjects, except that for chemistry and stenography are substituted physics and book-keeping.

NOTE.—The foregoing are under the same management as the Continuation Schools, but are special Day Schools.

3. *Drawing and Modelling*: (Forenoons and afternoons).

Freehand drawing, perspective, projection drawing, technical drawing for mechanics, modelling for teachers (each 3).

4. *Building Trades*: Special Class for Artisans (1 half-year). Forenoons. Algebra and geometry (4), descriptive geometry (4), German (2).

5. *Mechanicians*: Special Class (3 half-year courses). Forenoons.

First half-year.—Algebra and geometry (4), projection drawing (3), sketching ($1\frac{1}{2}$), chemistry ($1\frac{1}{2}$).

Third half-year.—Algebra and geometry (4), technical drawing (3), descriptive geometry (3), chemistry (2), physics (2), mechanics ($1\frac{1}{2}$), German (2).

Fifth half-year.—Algebra and geometry (4), technical drawing (6), physics (2), mechanics ($1\frac{1}{2}$).

6. *Electrotechnicians*: Special Class. Forenoons and evenings.

First half-year.—As for Mechanics above.

Second half-year.—As for Mechanics above.

Third half-year.—Algebra and geometry (4), drawing (6), physics (2), mechanics ($1\frac{1}{2}$), electrotechnics ($1\frac{1}{2}$), advanced exercises ($1\frac{1}{2}$).

7. *Gardeners' Apprentices*: Forenoons.

First half-year.—German (1), arithmetic (1), botany (2).

Third half-year.—Botany (1), landscape gardening (1), geometry (1).

Fifth half-year.—Surveying (1), landscape gardening (1), botany (2).

8. *Joiners' Apprentices*: Theoretical Courses (3 years). Forenoons, afternoons, and evenings.

First year.—German ($1\frac{1}{2}$), arithmetic and geometry (2), freehand drawing (3), projection drawing (3).

Second and third years.—Calculating (1), materials (1), freehand drawing (3), special drawing (5), wood-carving (2), book-keeping (2).

In each year, practical instruction from 7-12 a.m. and 2-6 p.m. daily (Saturday, 5), excepting the hours devoted to theoretical courses.

9. *Masons' Apprentices*: Three years' courses. Afternoons.

Building materials (2), drawing (2).

10. *Printers' Apprentices*: Four years' courses. Evenings.

German, arithmetic, book-keeping (each 2).

11. *Hairdressers' Apprentices' Courses*. Afternoons. Both men and women. Wig-making, etc. (2). German (2).

OTHER CLASSES

In addition to the above classes, instruction is given in various parts of the city in a great many subjects, such as stenography, French, Italian, English, commercial arithmetic, book-keeping, freehand drawing (adapted to the needs of the various trades), perspective drawing, modelling, drafting of all kinds, nature of materials, etc.

Courses in Drawing and Book-keeping are given for girls engaged as seamstresses, etc.; also instruction in Household Work: Mending, sewing, dressmaking, cooking, etc.

GERMANY

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GERMANY

INTRODUCTION

Many years ago the Germans discovered the paramount importance of education. After their reverses under the first Napoleon, they decided that chiefly to intellectual power they must look for national progress. The educational reforms then begun received an immense impetus after the overthrow of Napoleon the III; for it was then evident that to these reforms more than to anything else was due the success of the German arms.

Regard for
Education.

Of all the modern systems of education, the German is now admittedly the most comprehensive and the most highly organized and effective. An outline of the general system is needed to make clear the position of industrial education. It must be premised, however that any general statement is subject to numerous exceptions. Unlike the schools of England, the schools of Germany are free from Imperial control. Each State is educationally independent, and each municipality exercises freedom in the adaptation of its schools to local needs.

Character of
School
System.

ORGANIZATION OF SCHOOL SYSTEM

Attendance at a day school from six until at least fourteen years of age is compulsory in practically all the States of the Empire. Until ten, pupils attend a People's School, our Public School, or a special type thereof. At this age, the parent must decide whether his child is to remain at the Public School or to go to a higher school; and in nearly all the States he must continue his education until he is sixteen, seventeen or eighteen, according to the State in which he lives. In Germany, moreover, a boy's career is usually marked out for him from the first. The organization of the system is, accordingly, free from the difficulties that beset us in Ontario. If his father is a workman, he becomes one, too, and he usually remains in this class. Occasionally he rises, but such cases are far more uncommon than they are in Canada. As a result of this condition and of the general appreciation of education, the boy is trained in special schools for the exact position in life he expects to hold. In Germany everything is systematic, nothing is left to chance.

Effect of
social
conditions.

If, accordingly, when the pupil has reached the age of ten, he is to go on at the Public School, the provision is as follows:

I.
Public
School.

1 The Public School until he is fourteen, when many pupils need to go out to work.

Continuation
School
Courses.

2. A Continuation School until he is seventeen or eighteen. These schools continue the general education of the young workers, usually without broadening his scholarship, but some of them have courses that bear upon his future vocation. They provide three courses:

- (1) The General Course continued.
- (2) Industrial Courses.
- (3) Commercial Courses.

Generally speaking, as these three courses are taken usually by those who during the daytime are actively engaged in business, the classes are held in the evenings and on Sundays and holidays.

For the Continuation School, the pupil who desires a more thorough education may substitute:

Trade School.

(1) A Primary Trade School. Such schools are provided for textile workers, mechanics, locksmiths, etc.

(2) Special Trade Schools in great variety. Such schools are provided for textiles, carpentry, engineering, blacksmithing, navigation, ship-building, tanning, clock-making, printing, dyeing, etc.

Further
Industrial
Education.

Later an opportunity is given in experimental shops to apply knowledge, and, in work-shops, to conduct original investigation and experiments. For master tradesmen there are also clubs providing practical courses and workmen's shops for further instruction.

If, however, the pupil is to take a higher school education, he leaves the elementary Public School at ten and enters a secondary school. Here also he has to choose amongst the following:

II.
Gymnasia.
Classical.

1. A Classical Gymnasium, with a nine years' Latin, a six years' Greek, and a seven years' French course.

Real School.

2. A Real Gymnasium, with a nine years' Latin course and a six or seven years' course in French and English, respectively; more attention is being given to modern languages, science and mathematics than to Latin.

Ober-real
School.

3. An Ober-real School, with a nine years' French and a seven years' English course; science and mathematics receiving special attention.

Each of these types has its sub-class, in which the instruction ends with the sixth year.

Subsequent
Courses.

The Classical and Real Gymnasia lead to a university; the Real and Ober-real Schools are for those who desire a more practical training or who intend to enter the higher industrial or commercial schools. At the end of the sixth year course, the student may obtain by examination a certificate which reduces the two years' compulsory military service to one, and also confers upon him other advantages which present strong inducements to complete at least the six years' course. At the end of the ninth year's course, the student may enter on a classical, literary, or technical course at

an institution of university rank. As so few, however, take the nine years' course, the six years' course is so arranged that it practically covers all the subjects of a good education, the additional three years of the nine years' course, when taken, being spent in obtaining a more complete mastery of the subjects.

TECHNICAL EDUCATION

Even as early as the sixteenth century there were continuation schools here and there in Germany, and about the middle of the eighteenth century Frederick the Great of Prussia ordered that all the masters of trades should send their apprentices who were not proficient in reading, writing and arithmetic for instruction in these subjects four hours a week. In Baden also it was decided that technology and drawing should be taught in the People's Schools of towns having trades and art industries. In the beginning of the nineteenth century technical schools were provided in many Germans towns, including mining schools in the mining districts. In Prussia trade schools were established for the building trades, and in Saxony for lace-making, basket-weaving, etc. But it was not until the London Exhibition of 1851 that the Germans discovered from the exhibits that, if they were to compete with France, their technical school system must be more fully specialized. With the energy that characterizes them as a people, they at once took measures to meet the situation. Since then and especially since the war with France in 1870-1871, when, as I have already said, they found out that their success was largely due to education, they have provided a system of technical schools as yet unequalled in the world. In discussing this characteristic of the German system, in my report of 1901, I quoted a lucid paragraph from an address by Dr. Loudon, then President of Toronto University. I quote the paragraph again:

Beginnings
of Industrial
Schools.

Origin of
modern
system.

General
character-
istics.

The technical system of Germany covers the whole field of industry and commerce. It distinguishes clearly between the general and the technical. No attempt is made to put a veneer of technical training on a defective general training. It distinguishes between the training of the director, the foreman, and the operative. In all grades it concentrates effort on the underlying principles of art and science and their application. The general result is a thoroughly trained body of workmen under scientific leadership.

Modern
development.

During the last quarter of a century in particular, technical Causes. education has developed with great rapidity and there has been an equally remarkable advance in scientific knowledge; now, practically every German town is supplied with technical schools. In many States, as in Württemberg, for example, these schools are very numerous, and specialization is carried to a high degree.

People generally well educated.

Nature has not provided Germany with the means of becoming prominent in agriculture. Compared with many other countries, her soil is poor. Her increasing population has made her a nation of manufacturers, and, accordingly, a nation strongly in favour of a thorough system of industrial and commercial as well as of general education. Indeed, one main cause of the eminence of Germany, even in industrial matters, is the fact that practically all her people are well educated. In Prussia, for example, the percentage of illiteracy is only .02; and in Württemberg no one over ten years of age is unable to read and write.

State control; varieties.

Like her general system of schools, the system of technical schools is both highly organized and very comprehensive.

The tendency in Germany at present appears to be for each State to control as far as practicable all its educational institutions. This, however, has been only partially accomplished in the case of industrial and commercial education; for many private associations of various kinds provide courses on payment of fees. In Prussia, for example, out of a total of 2,278 business schools and schools for skilled factory employees (of the secondary type), there were a few years ago 428 such schools which provided for a great variety of trades. The control of the industrial and technical schools varies also in different States. In Bavaria, they belong to the State Department of Education. In Prussia, however, they are looked at from another point of view and are controlled by the Minister of Trade and Commerce; and in Saxony, Baden, and Württemberg, their control is divided between the Departments of Agriculture and the Interior. The rural schools throughout the Empire belong to one or other of the last-named Departments.

Fees.

Fees are usually charged. They run from 25 cents a month for each subject in the girls' evening schools to \$25 a term in the building trade schools; but, for cause, these may be partly or entirely remitted. In the textile schools of Prussia, however, the fees run from \$50 to \$200 a year, according to the character of the work taken up and the nationality of the student. A foreigner is charged more than a native of another German State, and the latter more than a native of the State in which the school is situated.

Classification of Industrial and Technical Schools.

Owing to the great variety of the industrial and technical schools, due largely to their origin, the time of instruction, the entrance requirements, the very general separation of the sexes, the great number of the trades, the adaptation of the schools to local necessities, and the differences in their relation to the State, the municipalities, and the private associations, it is impossible to make a logical classification. For the purposes of a general presen-

tation the industrial and technical schools have, however, been divided roughly by the Germans themselves into three classes:—

1. The Lower Schools (Industrial).
2. The Middle Schools (Industrial and Technical); and
3. Higher Schools (Technical).

I. LOWER SCHOOLS

The Industrial Continuation Schools are the lowest grade of industrial schools and correspond in position to the English Industrial Higher Elementary Schools. As a rule, they give the workmen trade instruction of a general character; and, as they are bound up in the general scheme, from them the pupil may enter special trade schools. They are intended for apprentices who aim at becoming skilled journeymen. There are, however, many varieties of schools, and some develop into schools of the next higher grade. These schools may be roughly classified as follows:—

1. General Industrial Schools, where the instruction serves as a preparation for any of the trades and where no special trade is taught. General character; istics.
2. Special Trade Schools, where instruction is given in each trade or group of trades; as, for example, in Munich; and
3. Agricultural Schools, where the instruction is of a general character, but with a distinct agricultural outlook. Classes.

While the period of attendance of boys at a continuation or other school varies in different parts of the Empire, it is compulsory in most of the States until he is about 18 years of age, and the laws on this subject are yearly becoming more exacting. In many States also employers are compelled to see that their employees attend these schools, and to allow them to attend a certain number of hours a week in the day-time. Compulsory attendance; Boys.

Attendance at a continuation school is, however, not generally compulsory in the case of girls. It is so in Prussia, Bavaria, Württemberg, Baden, Waldeck, and Saxe-Meiningen; but not in the other States of the Empire. Indeed, from the time of the Revolution until the last quarter of the nineteenth century, the education of boys alone received attention from the municipalities. Girls.

The power to establish Continuation Schools as well as to compel attendance is in the hands of the individual States and sometimes of the individual municipalities; but when they are once established, the pupils must attend and parents must see that they do so. With the following exceptions, all the States have compulsory attendance laws: In Prussia attendance is compulsory by local by-law, except in Posen and West Prussia, where attendance is compulsory by State law; in Hamburg and Lübeck attendance is

enforced by the Guilds; and in Schaumberg-Lippe employers are compelled to allow attendance for a period up to eighteen years of age. The by-laws vary greatly in different parts of Germany. In some towns only boys engaged in trades and commerce are compelled to attend; in others all boys, and sometimes girls, are compelled; and the number of the compulsory hours of attendance also varies.

Imperial
Order of 1891.

The obligation to attend Industrial Continuation Schools was imposed by the Imperial Law of 1891, one of the few instances, it may be noted, in which the Imperial Government has legislated for the educational organization of the States. The order itself was a direct result of trade competition with other countries, the United Kingdom in particular. In view of the situation in Ontario, the following sections of the order are well worth quoting:

Section 120. The masters in any branch of industry are bound hereby, in the case of their workers under the age of 18 who attend an institution recognized by the authorities of their district or their State as a continuation school, to allow them the time fixed as necessary for such institution by the authorities. . . . Through the ordinance of a district council or any wider communal body, attendance at a continuation school may be made obligatory for all male workers under the age of 18. In the same way, proper regulations may be made to secure the execution of such an ordinance. In particular, regulations may be passed to insure regular attendance and to determine the duties of parents or employers in this respect, and notices may be issued by which organization in the continuation school and a proper relation of the scholars to it may be assured. From the compulsory attendance based on such an ordinance are exempted only those persons who attend another continuation or technical school, provided that the instruction given in such school be recognized by the higher authorities as a complete equivalent for that given in the general continuation school . . .

Section 150. A breach of section 120 of this law is punishable by a fine not exceeding 20 marks (\$5.00), or, in case of non-payment of such fine, by imprisonment for a term not exceeding three days.

Württemberg:
Compulsory
School Law
of 1909.

Condition of
the Kingdom.

The new school law at Württemberg, which went into effect in April, 1909, deserves special notice, for it marks the greatest advance in industrial legislation since the provision for compulsory attendance at continuation schools. The kingdom has long been famous for its school system, crowned by its University at Tübingen, and its Polytechnic at Stuttgart. In 1900 the population of this kingdom was about 2,170,000, but its area is only five times that of our County of Bruce. The country is, of course, densely populated. Two-thirds of the land is under cultivation, and about one-half of the population are engaged therein. Geographically, however, the kingdom is at a disadvantage in the industrial struggle, and accordingly every effort has been made to develop its industries.

Provisions of
the law.

The new law provides that every commune in which for three successive years, at least forty male workmen under eighteen have

been engaged in commercial or industrial pursuits shall in future provide an industrial or commercial school, and shall maintain such school so long as the number of workmen under eighteen does not fall below an average of thirty during three successive years. The ordinary type of school will be an industrial school, and, if the needs of the community require it, a commercial school must be established in addition. In the case of very poor communes the State may sanction the postponement of the building of an industrial school for ten years, but in all cases a general continuation school must be provided. The elementary school course usually ends at fourteen; but every youth under eighteen who is engaged in industrial or commercial pursuits is obliged by the new law to attend the continuation school for three years thereafter, and if the commune so decide he may be required to attend for a fourth year. Employers must supply the names of the employees affected and set them free to attend the continuation school. Parents and guardians must see to it that the law is carried out. Penalties are provided for neglect of duty on the part of employer, pupil and parent, or guardian. The law also permits communes to make attendance at this school compulsory for girls under eighteen who are in employment, and permits communes to establish industrial schools for them or departments for them in other industrial schools.

The public attitude toward compulsory industrial education from 14 to 18 is generally favourable. It is felt to be a burden; but the German is far-seeing and patriotic enough to bear willingly a burden that increases his profits and gives his country eminence in the markets of the world. Some employers, as is to be expected, regard their apprentices as a source of cheap labour, and occasionally, where compulsory attendance is enforced for boys, they replace the boys by girls wherever they are able, especially in commercial offices. When, therefore, the compulsory attendance of girls is proposed, such employers are its bitter opponents.

The Board in charge of a Continuation School is composed generally of a member of the Municipal Council; the Director, or Principal, of the school; representatives of the bodies that contribute toward the support of the school, as, for example, Trade Guilds, Chambers of Commerce, with occasionally representatives of the workmen. In the organization of the school the State Inspector has usually a good deal of influence, but there is no general organized system of supervision.

In Germany, I may here point out, the Trade Unions do not claim representation on these Boards. They appear to be satisfied with the provision for instruction and attendance and feel that justice is being done to both the employee and the employer. Moreover, the German, though disposed to fault-finding, is natur-

Attitude of
Germans to-
wards com-
pulsory
attendance.

Boards of
Management.

Attitude of
Organized
Labour.

ally submissive to constituted authority, and the study of civics which is generally carried on in the schools gives the workmen a fairly sane view of economic problems.

Curricula.

The main feature of the German curriculum for the Lower Industrial Schools is the combination of theoretical instruction with work-shop practice, and the concurrent courses for culture and for citizenship. The only subjects that appear to be common to all are German, practical arithmetic, and drawing. In the Commercial Schools, the subjects are usually commercial correspondence, law, arithmetic, and geography; book-keeping, stenography, typewriting; the others varying according to the requirements of the locality. In some of the larger cities classes are also provided in algebra, trigonometry, geometry, science, French, and English. In the Agricultural schools, the subjects usually taken up are German; arithmetic; history, geography and science; and special training in agriculture. To these subjects are often added book-keeping, drawing, mensuration and land surveying, biology, and physics. In all the vocational schools the general education of the public school is continued in its essential features.

Qualifications
of Teachers.

Few of the Lower Industrial Schools, which are held in the day-time, take up all the time of the teacher of the industrial subjects; for the hours in which he is employed are comparatively few. For the academic subjects, the teachers of the evening classes are those of the Public School, who take this work in addition; and, for the technical subjects, workmen who are employed during the day and have recent technical knowledge and skill. Such workmen may or may not have pedagogical qualifications. In a few of the States—Prussia, for example—the teachers take special courses of from four to six weeks at the expense of the State, or communities, or localities. Special examinations for industrial teachers are also sometimes held, but this provision is, as yet, exceptional. In this connection, it should not, however, be forgotten that under a system of education, compulsory usually until he is eighteen, the German workman is generally better educated than the workman of most other countries. Nevertheless, one of the difficulties in connection with the Lower Industrial Schools, which the Germans have not yet completely overcome, is the scarcity of competent teachers. The schools have developed so rapidly that the supply has not kept up with the demand.

II. MIDDLE SCHOOLS

Of the Middle Schools there are four chief classes—the Schools of Industry, Workmen's Schools, Higher Trade Schools, and Technicums, each with a variety of courses. Many of the lower grade schools have courses which suit as a preparation for any trade. These middle grade schools, however, have a definite industrial aim, and provide for those who intend to become foremen or superintendents, and for workmen who have no expectation of being able to take one of the higher technical courses.

The Schools of Industry and the Workmen's Schools offer a higher education to workmen. Generally speaking, the latter are organized for journeymen who desire to become master workmen, and the former for the older workmen who desire simply to become more skilled in their trades and to acquire, perhaps, the knowledge which may enable them to conduct small businesses of their own. Such schools are necessarily evening schools.

Here I may refer to the Prussian Travelling Courses for Trade-masters and Factory Foremen, which are, however, provided only in factory districts. In 1908 they furnished 987 courses in 48 centres. The cost was large, and was defrayed partly by the State. The instruction is given by travelling teachers during the winter and is sometimes connected with the trade schools of the locality, but often with permanent "Industrial Halls," where the work of apprentices is exhibited beside that of journeymen and master workmen, and even of the factories. Such a hall has been established in Cologne and a number of other cities.

The Higher Trade Schools are technical in character, being in some respects the most advanced of the Middle Schools. Before entering, the student must have a fair knowledge of elementary mathematics and physics (about two years of our High School course), as well as knowledge and skill as a workman. These schools provide for young men who aim at the higher positions in manufacturing establishments or who may go to the Higher Industrial Schools. While engaged in their occupations they take day-courses for two or three years.

For admission to the Technicums the age limit is lower than in any of the other Middle Schools. Pupils are required to be at least fifteen and to have had a couple of years' study in a gymnasium. For them, one year's previous work-shop practice is sufficient, but they may, however, complete their apprenticeship before they enter. The courses extend over two or three years and are designed to fit men to manage the smaller independent enterprises and to hold positions mid-way between those held by the journeymen and those held by the graduates of the technical

schools of university rank. These Technicums are under State supervision, and are maintained by the State and the local municipality. The German manufacturers attach great importance to them, and encourage their establishment in every possible way.

III. HIGHER SCHOOLS

Grade and
character of
work.

The Higher Industrial Schools are of the university rank, and include the "Technical High Schools" and practical science departments in certain universities, some of the higher special industrial schools, and a few of the technicums which have developed abnormally. These institutions prepare the highest class of engineers and technical specialists, who fill the most important industrial positions all over the world. When the student enters the "High School" he selects his department—Civil Engineering, Mechanical Engineering, Electrical Engineering, Mining Engineering, Architecture, Applied Chemistry and Physics, etc. Outside of one course of lectures, he may take what he pleases. As regards practical work he may spend the greater part of his time in the laboratory alone or with a member of the staff. He passes the Primary examination at the end of his second year, and the Final at the end of his third, when he must submit some important piece of original work. While thoroughness is indispensable, each student is permitted to acquire his knowledge as far as possible in his own way. To the research conducted in the Technical High Schools Germany is greatly indebted. This the manufacturers realize, and they do all in their power to aid the scientist by undertaking experiments under his direction and by contributing to the expense of his research work.

NUMBER OF INDUSTRIAL AND TECHNICAL SCHOOLS

Lower
Schools.

The Lower Industrial Schools are very numerous, and are very widely distributed throughout the empire. For the ordinary artisan they are the most important of the system. In Prussia, in 1907, there were 1,579 Industrial Schools for boys, with an attendance of 280,427, and a State subsidy of about \$500,000; 357 commercial continuation schools, with an attendance of 43,584, and a State subsidy of nearly \$35,000; and 3,477 rural continuation schools, with an attendance of 532,932, and a State subsidy of over \$85,000, the total cost being nearly \$135,000. Of the rural schools 8 gave special trade instruction.

Middle
Schools.

Of schools of the Middle class, there are over 750 (about 90 being private), covering all the departments of industrial work—mechanics, textiles, architecture, and building construction, mining.

metallurgy, wood-carving, ceramics, industrial art, farriers, navigation and marine mechanics, fresh water navigation, ship-building, etc.

Of the Higher Schools, that is, those of university rank, ^{Higher Schools.} there are nine, with, in addition, three Mining Academies, five Forestry Academies, four Agricultural Academies (the one in Bavaria having also a department of Practical Brewing), five Veterinary "High Schools," five Commercial "High Schools," two Royal Academic Schools of Art, with a number of Art Academies in other States.

MAINTENANCE

As has already been pointed out, the organization of industrial ^{In Prussia.} and technical education differs in the different States. Accordingly, no reliable statistics of the cost can be given except State by State, and then not always in detail. A few examples will, however, show the general situation.

The Prussian State Industrial Bureau, established in 1905, has issued a report showing the State expenditures for certain classes of industrial schools. These statistics are only a partial statement of the expenditures, but they show the fostering care of the State itself:—

1. For 22 schools for metal workers, \$265,762.
2. For 41 schools for Trade and Industrial Arts, \$218,654.
3. For 23 schools for building trades, \$355,876.
4. For 13 textile schools, \$91,705.
5. For 2,278 courses for factory employees and business, \$513,871.
6. For 70 schools for home industries and business for girls, \$23,869.
7. For travelling schools with 987 courses in 48 cities, the amount was large and was partially defrayed by the State, but it is not ascertainable.

The sums expended by the municipalities are in many cases far ^{General.} larger than those contributed by the State. Under the system of taxation as between the Empire and the Federated State, it is to the latter alone that financial assistance can be looked for.

Besides their revenue from State and municipal grants, many Industrial Schools, however, receive assistance from local guilds and like corporations. As the attitude of Germany towards the support of its Industrial Schools has been a subject of discussion in Ontario for some years, I submit a table received last August through the British Ambassador at Berlin. The table shows the percentage of local and State support in all the German States:—

The Share of the State Contributions towards the Total Expenditure for Industrial and Technical Education in the German Empire

NOTE: Except in Prussia, Bavaria, Saxony, Wurttemberg, Baden, Hessen and Brunswick, there are no Technical High Schools.

| FEDERAL STATE. | HIGHER INSTITUTIONS. | MIDDLE INSTITUTIONS. | LOWER INSTITUTIONS. |
|--|---|---|---|
| | | 54% | 38% |
| Kingdom of Prussia..... | The higher Industrial Educational Institutions (Technical High Schools), are State Institutions and as such are exclusively supported by the State. | The percentages above have reference in general only to the cost of instruction. For the furnishings of the schoolrooms and school buildings and for maintenance of the same, the State as a rule makes no contributions. | |
| Kingdom of Bavaria..... | As in Prussia..... | The middle industrial institutions in Bavaria are partially State institutions which are supported exclusively by the State, partially Municipal or district institutions to which the State makes contributions. The total expenditure for other than State schools is not known, consequently the proportion of the State contributions to these cannot be given. | 9.4% |
| Kingdom of Saxony..... | As in Prussia..... | 24.8% For a few institutions standing between the middle and higher classes of Industrial schools the State contribution amounts to 74.1% | 69.5% The percentage has reference only to the General Continuation Schools, not to the Trade Schools. For the latter, the necessary statistical information is not available. |
| Kingdom of Württemberg | As in Prussia..... | About 75% of the cost of middle and lower industrial education is covered by the State contributions. A separate statement for these two spheres of education is not possible since no clear dividing line is drawn between middle and lower industrial education in the individual institutions. | |
| Grand-duchy of Baden.... | As in Prussia..... | 50.7% | 42.2% |
| Grand-duchy of Hesse.... | As in Prussia..... | 27.5% | 26% |
| Grand-duchy of Mecklenburg-Schwerin..... | None..... | The necessary statistical basis for a statement of the share of the State contributions in the total expenditure for middle and lower industrial education is not available. | |
| Grand-duchy of Saxony... | None..... | 24.7% | 51.3% |
| Grand-duchy of Mecklenburg-Strelitz..... | None..... | The necessary statistical basis for a statement of the share of the State contributions in the total expenditure for middle and lower industrial education is not available. | |
| Grand-duchy of Oldenburg | None..... | The necessary statistical information for a statement of the share of the State contributions in the total expenditure for middle industrial education is not available. | 50% |
| Duchy of Brunswick..... | As in Prussia..... | 13.2% | 31.5% |
| Duchy of Saxe-Meiningen. | None..... | 55.3% | 20.1% |
| Duchy of Altenburg..... | None..... | 5.9% | 36.7% |
| Duchy of Coburg-Gotha... | None..... | 60.2% | 42.2% |
| Duchy of Anhalt..... | None..... | 16% For a school which stands half-way between the middle class and higher industrial institutions, the State contribution amounts to 13% of the total expenditure. | 39.7% |

The Share of the State Contributions towards the Total Expenditure for Industrial and Technical Education in the German Empire—Continued

| FEDERAL STATE. | HIGHER INSTITUTIONS. | MIDDLE INSTITUTIONS. | LOWER INSTITUTIONS. |
|--|----------------------|---|---------------------|
| Principality of Schwarzburg-Sondershausen... | None..... | There are no middle (class) industrial institutions. | 20.1% |
| Principality of Schwarzburg-Rudolstadt..... | None..... | There are no middle (class) industrial institutions. | 20.7% |
| Principality of Reuss-Elder Line..... | None..... | 11.4% For a school which stands half-way between the middle class and higher industrial institutions, the State contribution amounts to 32.8% of the total expenditure. | 30.5% |
| Principality of Reuss-Younger Line..... | None..... | The necessary statistical information for a statement of the share of the State contribution towards the total expenditure for middle and lower (class) industrial education is not available. | |
| Principality of Schaumburg-Lippe..... | None..... | There are no middle industrial institutions. | 24.6% |
| Principality of Lippe.. | None..... | 7.9% | |
| | | A separate statement for the two departments of education is not possible since the necessary statistical information for this is not available. | |
| Freeand Hanse town Lübeck | None..... | The State contributions amount to 84.8% of the total cost in case of the industrial school; 58.6% of the total cost in case of the builders' technical school; 7.8% of the total cost in case of the women's industrial school. | None. |
| Freeand Hanse town Bremen | None..... | 63.8% | 78.6% |
| Free and Hanse town Hamburg..... | None..... | The middle and lower (class) industrial institutions of learning are all State schools, which are supported by the State. | |
| Alsace-Lorraine..... | None..... | 88% | 40% |

NOTE: The above statements are partly for the year 1907-08, partly for the year 1908-09, and partly the average of these years.

BERLIN, August, 1910.

SCHOOLS VISITED

In Germany I visited the States of Bavaria and Prussia. In Bavaria I gave most of my time to the Continuation Trade School system of Munich, as being of special interest to Ontario at the present juncture. In accordance with the advice I had received at Whitehall, I visited, in Prussia, the Royal Building Trades School and the Royal Higher Machine Construction School, in Cologne; and the Higher Technical School for Textiles, the Technical High School, the School of Mines, and the Art School, in Aix-la-Chapelle.

MUNICH

GENERAL

Character of
Industries.

Munich, with a population of over half a million, has few large factories. Its industries are varied and numerous, there is little sub-division of labour, and there are many small workshops. The conditions have, accordingly, been especially favourable to the establishment of a comprehensive system of continuation industrial schools. This result has been accomplished at the instance and under the direction of Dr. Kerschensteiner, the Superintendent of Education for the City. Not all educationists, not by any means all the Germans either, believe that his combination of the theoretical and practical is the most effective. In Prussia, in particular, the conviction is that the chief duty of the industrial and technical schools is to teach the theory; the employer's workshop is the right place to apply it. There can be no doubt, however, that, although not all the schools are equally efficient, Munich now possesses the most complete system of trade schools to be found in the world.

Continuation
Industrial
Schools.Foundation
of the system

The foundation of the system is the effective training of the apprentice. The main objective point of this training is industrial; but it includes instruction in the economic and commercial aspects of each trade and also in the duties of citizenship. The apprentice must become both a skilled worker and a good citizen.

Other Indus-
trial and
Technical
Schools.

Nor is the industrial system confined to the apprentice. It provides for the further instruction of the journeyman and the master workman. Munich contains also a Trade and Technical School, a Technical High School, a Veterinary High School, and an Academy of Art.

Manual
Training and
Household
Science.

Moreover, in the Public Schools of Munich provision is made for Manual Training and Household Science as a means of education. As elsewhere, the main object is cultural, but these subjects

serve also as a basis for a trade. Special attention is paid them during the last school year. Then, wood-work and metal work are taken, each half a year, four hours a week being given each subject, as well as an hour for drawing. The boys also take practical chemistry and physics two hours each. In their last year they spend 36 hours a week at school; in the earlier years, 28 hours. The girls, who are in separate schools, take the usual subjects of a Household Science course, including sewing. In the lower classes a good deal is done of what we know as constructive work.

The City schools are under the control of a Board of Directors, ^{Management.} composed of the (second) Mayor of the City, as chairman, members of the City Council, school Inspectors, representative citizens, a prominent clergyman of the Catholic and of the Protestant religions respectively, delegates from the Chambers of Commerce, Industry and Handicrafts, and the head of the teaching staff of each of the schools themselves. Every effort is made to secure as members the best citizens available. Allied subjects are grouped together in the different school buildings, with a separate staff and director for each. When, in Bavaria, State grants are given, the schools are inspected by a State officer, as well as by a local officer. Dr. Kerscheneister is satisfactory to the State Government. In Munich, accordingly, the local Inspector and the government Inspector are the same. Where a Trade Guild exists, it is expected to assist in ^{Relation of} the establishment and management of the Sunday and Evening ^{Trade Guilds.} Classes. Generally, also it pays for the material used in the shops, and provides objects that are useful for illustration in the practical work.

The schools, especially the workshops, are elaborately fitted ^{Equipment.} out with the most up-to-date equipment, better, indeed, in some cases than are the establishments in which the students are employed. Most of the schools have also collections of models and of specimens of the pupils' work, a feature which, I may add, is being imitated in other countries.

In the technical subjects, instruction is, in most cases, given ^{Qualifications} by an expert member of the trade or business. ^{of teachers.} In the academic subjects, it is given by the day-school teachers of the elementary schools. The city encourages its trained teachers to learn trades and gives them leave of absence for the purpose. In Munich, however, as elsewhere, it is not always easy to secure thoroughly competent teachers for all the classes.

CONTINUATION SCHOOLS FOR BOYS AND MEN

The Continuation Schools for men and boys may be classified as follows:—

- I. Compulsory Day Schools for Apprentices.

2. Voluntary Sunday and Evening Schools for Journeymen and Master Workmen.

3. Voluntary Day Classes for unemployed Master Workmen and Journeymen.

1. COMPULSORY DAY SCHOOLS FOR APPRENTICES

GENERAL

Length of compulsory attendance.

The attendance at the schools for apprentices is compulsory for the full period of the apprenticeship—for at least three years, sometimes for four years—after completion of the courses of the public school; that is, from 14 to 18 years of age; and sometimes even longer. Employers are also compelled to allow their employees to attend these schools for from six to eight or ten hours a week; but every effort is made to suit the convenience of the employers. In the case, for example, of wood carvers and sculptors, the schedule calls for 14 hours during the winter term and 3 during the summer.

Apprentices not paid while attending schools.

As a rule, apprentices receive no pay for the time they spend in the schools; but there are various trades in which this is not the case. In reply to my objection that the forfeiture of part of his pay might induce the apprentice to go where there were no compulsory continuation school classes, Dr. Kerschensteiner made the following statement:

There is no exodus of apprentices from the city as a result of their being deprived of their pay for a few hours a week on account of the compulsory continuation classes. At least I know of no complaint on this score anywhere in the German Empire. In Munich such a thing cannot occur, for the very reason that our organization forms one of the strongest attractions to the apprentice. On the contrary, a considerable number of apprentices come from other municipalities to our Continuation Classes, and their employers even pay their transportation expenses. If you promote really good Continuation Schools there will certainly be little danger that the apprentices will run away.

Subjects and character.

The compulsory subjects are: Commercial correspondence, book-keeping and arithmetic; German literature, civics and hygiene; drawing; the use of tools and machinery; practical work; the practical course being adapted to the different trades. Religious instruction is by law compulsory, and courses in gymnastics are provided. In accordance with the general scheme in Germany, the theoretical foundation of each trade is closely related with instruction in the processes of the trade; that is, for example, the mathematics of the school are the mathematics of the shop whatever the latter may be. A remarkable feature of the continuation schools is their collections of models and specimens of work done in the trades. These not only extend and improve the student's knowledge of his work, but they serve as suitable objects for the drawing class.

School Museums.

In Bavaria generally, the instruction of the apprentices is given ^{Time of Instruction.} in the evenings and on Sundays. In Munich, however, it is given on week days and in the day-time. The available hours are from 7 a.m. to 9 a.m., and from 1 p.m. to 7 p.m., the hours of labour of the workmen being from 7 a.m. to 6 p.m., with a longer period for dinner than in Ontario. There are no compulsory classes on Sundays or after 7 p.m. on week days.

Of the Compulsory Day Schools there are three classes—District, Trade, and Commercial:

1. DISTRICT SCHOOLS

The theoretical instruction includes in each case the subject ^{Curriculum.} of religion, taught Protestants and Catholics in separate classes, arithmetic, composition, duties of citizenship, gymnastics, one hour a week in each. Where practical work is taken up, two hours are devoted to it, making seven hours a week in all. There are 13 schools in different sections of the city, 8 of them giving theoretical instruction only, 4 both theoretical and practical, and one being the School for Defectives, which was organized in 1908-09, and offers, ^{School for Defectives.} at present, a one-year's course. It receives pupils of defective preparation, or those who are intellectually backward, the instruction given being of such a kind as not only to impart information and manual dexterity, but also to develop character.

Boys under 18, who are not apprenticed to any trade, as, for ex- ^{The un-} ample, elevator boys, labourers, etc., are given a general education ^{apprenticed.} in German, commercial correspondence, arithmetic, civics, drawing, gymnastics, and manual work.

2. TRADE SCHOOLS

Subjects more closely allied to one another are grouped to- ^{Curriculum.} gether, and instruction both theoretical and practical is given in six principal school buildings. In addition to these, accommodation is provided separately for a large number of the smaller more detached trades. The time-table in each case is fixed with regard to the convenience of the trade in question.

Nearly all of the Munich Trade Schools receive a small money ^{Maintenance.} contribution from a Royal National Fund. In most cases also the Guild of the trade contributes something to the support of its school. For apprentices, the instruction is free.

3. COMMERCIAL SCHOOLS

These schools train merchants, clerks, and secretaries.

II. VOLUNTARY SCHOOLS FOR JOURNEYMEN AND MASTER WORKMEN

Curriculum.

The technical courses for journeymen and master workmen include freehand, projection and mechanical drawing; painting and modelling; beaters' work; chased work; business methods; study of manufactured products; elementary practical geometry; chemistry; physics; work-shop and laboratory practice.

The following are also provided in addition:

1. *Business courses*, including commercial arithmetic; book-keeping; the study of exchange; the cost of production; commercial correspondence and commercial law.

2. *General courses*, including the history of citizenship and of industry; commercial and trade geography; hygiene; partnership; commercial law; insurance legislation; and constitutional government.

Work-shops.

All the Industrial Schools have corresponding work-shops; and, if the system develops, as is expected, there will be a voluntary continuation school for journeymen and master workmen corresponding to each compulsory continuation school for apprentices. The classes are held on Sundays and in the evenings. A small fee is charged. On Sundays and holidays, the instruction is given in the forenoon, sometimes in the afternoon; on work-days, it is given in the evening; and at least five hours a week must be devoted to it.

Time of Instruction.

III. VOLUNTARY SCHOOLS FOR UNEMPLOYED JOURNEYMEN AND MASTER WORKMEN

For master workmen and journeymen who are out of employment, as, for example, masons who cannot work all the year, there are schools held in the daytime, as follows:

Trade Drawing Schools.

1. Trade Drawing Schools, with a schedule of instruction, mainly for those who desire to extend their knowledge of drawing; as, for example, builders, artistic and mechanical draughtsmen, furniture designers, etc.

In these schools, practical work is a minor feature of the course.

Students' Practice Schools.

2. Students' Practice Schools, with a schedule of instruction. In these there is special practical work for those who need additional technical education.

3. Open Drawing Rooms for journeymen, without a schedule of instruction. For them, as for all students of the industrial schools, ^{Open Drawing Rooms.} ample provision is made for instruction in drawing.

The first two are for defined trades, and have courses of at least 30, at most 48, hours a week. The last prepare for widely different callings, with courses of from 30 to 36 hours a week.

IV. OTHER INDUSTRIAL SCHOOLS

There are also in Munich, Industrial Schools maintained by Guilds and Industrial Unions. These use the equipment of the municipal schools; but, when they do so, the officers of these schools take part in the organization and management.

CONTINUATION SCHOOLS FOR GIRLS AND WOMEN

Every girl, including domestic servants, who does not attend ^{Organization: Secondary and Day Schools.} a secondary school must attend a continuation school until she is 16. This compulsory instruction is given chiefly on week-days, three hours a week. All who do not attend these day continuation schools are obliged to attend a "Sunday School," instruction at which has been obligatory since 1903. This school provides for girls from 13 to 16, also for three hours a week. About 17,000 receive instruction in the Continuation Schools, including those who take both the Sunday Schools and the Day Schools. The majority are taught on week-days.

As the foregoing schools do not supply sufficient instruction, the citizens of Munich have also established a more comprehensive Continuation School, with two divisions, one for domestic science and one for the commercial subjects. Each class receives from six to ten hours' instruction a week, and each pupil must attend regularly the courses for which she is enrolled.

The Sunday, as well as the Day Continuation Schools, are intended in particular to prepare girls for the duties of their future homes. The curriculum extends over three years and provides instruction in household science, including house management, sewing, millinery, cooking, etc., with a woman's duties as a citizen.

Two other schools are provided for girls:

1. The Municipal Riemerschmid Commercial School.

^{Other Vocational Schools.}

This School is a day school and gives instruction in advanced commercial subjects. The courses extend over three grades, for 25 hours a week.

2. The School of Women's Work, of the People's Educational Union.

This School is intended to prepare girls to earn their living in all the branches of women's trades. Combined with this is a Training College with a two years' course for instructors in hand-work in the elementary schools.

COST OF CONTINUATION SCHOOL SYSTEM

The importance attached by the citizens of Munich to its Continuation School System may be inferred from the fact that in 1906-1907 the total cost of these Schools was \$238,532.36 and, if we include the cost of the Commercial School for Women and the city's contribution to the Women's Work School, the total cost was \$265,785.69. The total attendance at all the Schools was 18,852.

CURRICULA OF CONTINUATION SCHOOLS

The following are characteristic examples of the organization of eight of the Continuation Schools, the number of times a week being in brackets:

CABINET-MAKERS

Apprentices. The course for apprentices covers 4 years, with 9 hours a week, distributed according to subjects, as follows:

Religion (1), composition and reading (1), arithmetic and bookkeeping (1), duties of citizenship (1), technical drawing (3), practical work (2).

Journeyman, etc. The journeymen's and master workmen's courses cover 3 years. The subjects are:

First year: Technology of wood (2); style (2); technical drawing (4); electricity (1); industrial chemistry (1); practical work (2).

Second year: Style (2); technical drawing (4); book-keeping (2); business and law (1).

Third year: Style (2); technical drawing (4); calculating (2); technology (2); perspective (2).

To supplement this regular instruction, the pupils are taken frequently to visit museums, expositions, etc., where special displays of products of their trade are to be seen.

BUTCHERS

Apprentices. For butchers a five-year apprentice course is given, the subjects in each being:

Religion (1); arithmetic and book-keeping (2) or (2½); composition and reading (2) or (2½); duties of citizenship (2) or (2½); practical work (1); making an average total of 8 hours per week in each year.

Maintenance. Considerable money contributions to the support of the School are made by the City Butchers' Guilds. The pupils have at their disposal a library of works dealing with all aspects of their trade.

BOOK-BINDERS

The school for book-binders provides a three-year course for Apprentices. apprentices, with 9 hours a week, and a one-year (voluntary) course for journeymen and master workmen. The subjects of instruction for apprentices, with the hours per week, are as follows:

First year: Religion (1); arithmetic and book-keeping (1); business composition and reading (1); duties of citizenship (1); drawing (4); wares and materials (1).

Second year: Religion (1); arithmetic and book-keeping (1); business composition and reading (1); duties of citizenship (1); drawing (3); practical work (use of tools) (2).

Third year: Religion (1); arithmetic and book-keeping (1); business composition and reading (1); duties of citizenship (1); drawing (2); practical work (use of tools) (3).

The courses for journeymen and master workmen include the subjects of book-keeping, calculation, drawing, and practical work. Journemen,
etc.

The apprentices' courses are given usually on week-days, morning and afternoon; the journeymen's on week-day evenings from 7 to 9 (theoretical instruction), and Sunday forenoons from 8.30 to 12.30 (practical work). Time of
Instruction.

Instruction for ordinary apprentices is free. A nominal fee Fees. is exacted from those whose masters are not members of the Book-binders' Guild. Journeymen who are natives of Bavaria pay 50c., natives of other German States, 75c., and foreigners, \$1.00 per month during the winter terms, and 25c., 50c., and 75c. respectively in the summer term. The proceeds from apprentices' fees go to the Book-binders' Guild; from journeymen's fees to the City Treasury.

Working material for the apprentices is furnished through the Book-binders' Guild from the Royal National Fund and the Bavarian Ministry of the Interior, the former contributing \$37 and the latter \$50. Journeymen supply their own materials. Working
material.

As in the case of all the other Munich trade schools, a substantial technical library is at the disposal of the pupils in book-binding. Library, etc. Educational excursions to factories, etc., are organized.

TAILORS

The school for tailors gives four years' course in the following subjects:

Religion (1); composition (1); arithmetic and book-keeping (1); duties of citizenship (1); wares (1); technical drawing (2); practical work (2); gymnastics (1); total, 10 hours per week. Curriculum.

The instruction is given on three week-day forenoons, from 7 to 12 o'clock, and on two afternoons from 2 to 7. Time.

The Tailors' School, like most of the other branches of the Munich trade schools, is supported by contributions partly from the National Fund and from the Trade Guild. Maintenance.

Excursions to museums, factories, expositions, etc., supplement the regular instruction.

MESSENGER BOYS

This school provides instruction in the following subjects:

Curriculum. Religion (1); arithmetic (1); reading and essay writing (1); duties of citizenship (1); manual training and drawing (2); gymnastics (1).

WAGONERS AND DRIVERS

This school provides instruction in the following subjects:

Curriculum. Religion (1); trade essay and reading (1½); arithmetic and book-keeping (1½); duties of citizenship (1); knowledge of horses (1); locality and by-laws (1).

BARBERS AND WIGMAKERS

This school provides instruction in the following subjects:

Curriculum. Religion (1); trade essay and reading (1); arithmetic and book-keeping (1); duties of citizenship (1); drawing (1); trade knowledge (1); elementary surgery (1); practical work (3).

COMMERCIAL SCHOOLS

The courses cover four years—one preparatory and three regular, with 8 hours a week. The subjects of instruction, with hours per week in each, are as follows:

Curriculum. *Preparatory year:* Religion (1); arithmetic (2); business correspondence (3); commercial geography (1); writing (1).

First year: Religion (1); arithmetic (2); book-keeping (1); business correspondence (1); commercial geography (1); duties of citizenship (1); writing (1).

Second year: Religion (1); arithmetic (1); exchange (1); book-keeping (1); business correspondence (1); commercial geography (1); duties of citizenship (1); writing (1).

Third year: Religion (1); arithmetic (1); book-keeping (2); business correspondence (1); commercial geography (2); duties of citizenship (1).

Maintenance. These commercial continuation schools are supported by the District Government and the municipality of Munich in equal shares. Additional contributions for school supplies, etc., are made by the Munich Chamber of Commerce and Commercial Association.

DUTIES OF CITIZENSHIP

The "Duties of Citizenship" form an important part of the Munich Industrial courses of study. The scope and character of the subject may be estimated from the following details:

CLASS I.—(a) *Hygiene:* The construction of the human body. Nutrition; food and luxuries; breathing, circulation of the blood; care of the skin and teeth; dwellings and clothing; work and recreation; gymnastics and exercise out of doors. The influences detrimental to health in the industry, especially the bad effects of dust; first aid in the accidents of the industry. Fostering of cleanliness. (b) *Deportment:* Demeanour in the house and outside; in the workshop; toward acquaintances; in school and in society.

CLASS II.—*Industrialism*: History of hand work in general and of machine construction in particular; beginnings in the construction of so-called machinery in ancient times. Significance of rotary motion for nearly all machines. Mechanical contrivances for war and conveyance in the middle ages; discontinuation of the machines of older times by the invention of the steam engine; recent engine construction; the most important engine shops of Munich. Allied industries. The present-day condition of engine building; the most important features of the industry; the protection of designs (through patents).

CLASS III.—*Citizenship*: Communal government; problems of communal society, its social and economic arrangements; rights and duties of the communal citizen; communal titular officials. The state constitution of Bavaria; problems of states unions; duties and rights of the citizens of the state; titular state officials. The Bavarian state government. The constitution of the German empire; the problems of the empire. Social legislation. Commerce and trade in the nineteenth century, and their significance for the well-being of the citizen and industrialist. The value of German consuls in foreign countries.

CLASS IV.—*The Citizen of the State in Public Life*: Human society, the social and economic distinctions in it; their origin, necessity and present development. General social and political economic systems (legislation, administration of rights, security, culture, and public safety). The part taken by the citizen of the state in the advancement of the common interests of life. The advantages of life under a united states government. Germany's economic and cultural position in the world. Industrial legal knowledge, especially legal instructions for conducting factories, steam plants, and such other mechanical systems; accident insurance.

TABLE SHOWING GENERAL ORGANIZATION

The following table for 1907-1908 shows the number of hours prescribed each week for each school, and the number attending the compulsory and the voluntary classes.

| Trade | Hours of instruction per week | Compulsory attendance | Voluntary attendance |
|---|-------------------------------|-----------------------|----------------------|
| Bakers | 6 | 265 | .. |
| Barbers and wig makers | 9 | 120 | .. |
| Bookbinders | 9 | 58 | 22 |
| Braziers and bell-makers | 8 | 127 | .. |
| Builders | 12 | 134 | .. |
| Butchers | 8 | 130 | .. |
| Cabinet makers | 9 | 126 | .. |
| Chimney sweeps and stokers | 6 to 9 | 26 | 84 |
| Confectioners | 8 | 81 | .. |
| Coopers | 9 | 32 | 18 |
| Coppersmiths | 10 | 53 | 13 |
| Decorators, varnishers and gilders | 7½ | 124 | .. |
| Dental workers | 8 | 43 | .. |
| Druggists | 9 | 119 | 25 |
| Engineers | 9 | 304 | .. |
| Gardeners | 8 | 78 | .. |
| Glaziers, etc. | 9 | 57 | 15 |
| Innkeepers' assistants | 8 | 85 | .. |
| Jewellers, silversmiths, goldsmiths | 9 | 62 | .. |
| Joiners and cabinet makers | 9 | 74 | 237 |
| Lithographers | 9 | 65 | 34 |
| Locksmiths, art metal workers | 9 | 343 | 116 |
| Musicians | 7 | 49 | .. |
| Opticians | 9 | 365 | .. |
| Photographers | 10 | 82 | .. |
| Potters, etc. | { 13 winter 3 summer } | 10 | 32 |
| Printers | 9 | 206 | 52 |
| Saddlers, etc. | 8 | 59 | 18 |
| Sculptors | { 14 winter 3 summer } | 60 | .. |
| Shoemakers | 10 | 88 | .. |
| Smiths and wheelwrights | 9 | 37 | 75 |
| Tailors | 10 | 170 | .. |
| Tinsmiths | 9 | 72 | 78 |
| Turners | 10½ | 19 | 15 |
| Upholsterers, etc. | 8½ | 80 | 53 |
| Wagoners and drivers | 7 | 19 | 178 |
| Waiters | 8 | 140 | .. |
| Watchmakers | 10 | 33 | 73 |
| Wood carvers | 9 | 14 | .. |
| Special school for painters | .. | .. | 381 |
| Special school for printers | .. | 648 | 145 |
| Special school for trades | .. | .. | 1,020 |
| Classes for pupils with no fixed trade | 7 | 1,049 | .. |
| Commercial schools for clerks and government servants | 8 to 10 | 1,019 | .. |
| | .. | 6,725 | 2,684 |

COLOGNE

ROYAL BUILDING-TRADES SCHOOL

GENERAL

This is one of twenty-four Prussian schools of similar character. The term "Royal," I may explain here, is applied to those schools which are conducted and maintained by the State—Prussia in this case. They often originate in a school connected with a factory and aided by the local municipality. Such a school, when of sufficient importance, is taken in charge by the State, the factory and the municipality being represented on the directorate. They are technical schools for the training, especially, of masons, carpenters, and stone-masons who wish to qualify for taking part in engineering and construction work and in Government work (railway, military, municipal engineering, etc.). All the Building-trades Schools are under the charge of the Minister of Trade and Industry. The examinations are under Government supervision.

Origin of
"Royal
Schools."

Aim.

The Board of Management has at its head a director appointed by the State, and includes representatives of the teaching staffs and the municipality.

Management.

The age of admission is 16 years; a public school education and one year's active work at the trade. The staff may, however, make exceptions according to the individual case.

Admission
tests.

Two half-year terms, beginning at the middle of October and the first of April respectively; holidays of about 11 weeks during the year.

Terms.

The fees are \$25 per term. For foreigners, five times this amount. Each pupil must insure himself against accident by the payment of a premium of 19 cents per term as a regular part of the school fees. This gives in case of death \$750; in case of permanent disability, the interest on \$3,750; and for temporary disability, 75 cents per day.

Fees.

All instruments for drafting, etc., are supplied by the pupil himself.

The School provides also the following:

1. A School for Workmen in the building trades, which is open only in the winter half year (middle of October to middle of March).

School for
Workmen.

2. Evening and Sunday Classes, which are held on Wednesday evenings, 8 to 10 o'clock, and on Sunday mornings from 9 to 12 o'clock.

Evening and
Sunday
Classes.

Instruction is offered in about 25 subjects, of which a free choice is allowed the student according to his needs and ability.

Admission tests.

The conditions of admission are as follows: Age, 18 years; an elementary school education; apprenticeship as a mason or carpenter; and at least one year as journeyman.

Fees.

For each term the fee is 50 marks (\$12.50); foreigners pay five times as much.

TECHNICAL DIVISION

Preparatory Course.

The studies in the Preparatory Class are German, arithmetic, elementary natural science, geometry, algebra, free-hand drawing, writing, drafting. The subjects in the five Forms, from lowest to highest, are as follows:

General Course.

Form V.—German and business correspondence, arithmetic, algebra (to simple equations), plane and solid geometry, natural science, theory of projection, building construction, architecture, planning of buildings, freehand drawing, modelling.

Form IV.—Subjects of Form V. in more advanced stages and, further, trigonometry, solid geometry, materials, statics, making of estimates. Total, 44 hours per week.

Form III.—Continuation of most of the subjects of Form IV., with the addition of surveying.

In the two highest Forms, work is specialized as follows:—

I. ABOVE-GROUND CONSTRUCTION

Special Courses.

Form II.—German, mathematics, theory of projections, statics, building construction, drafting of buildings, architecture, original designing of buildings, theory of structural form (evolution of architectural styles, etc.), freehand drawing, modelling.

Form I.—Theory of projection, statics, building construction, drafting of buildings, architecture, designing of buildings, planning of interiors, etc., freehand drawing, building estimates.

II. SURFACE AND UNDERGROUND CONSTRUCTION

Form II.—German, mathematics (logarithms, etc.), natural science and materials, railway architecture, surveying, levelling, drafting, etc., theory of construction, projection theory, statics, road construction, water works (dams, dykes, river regulation, river harbours, etc.), bridge construction, railway engineering, estimating of works, modelling.

Form I.—Mathematics, surveying, etc., theory of building construction, statics, municipal underground engineering (streets, water-works, sewers), water engineering (canals, reservoirs, dykes, harbour works, etc.), bridge construction, railway engineering, machinery.

Instruction in first aid is given to all pupils of Form III., 12 hours during the term.

SCHOOL FOR WORKMEN

Curriculum.

Junior Class.—German, writing, arithmetic (to extraction of square root), geometry (to circle), natural science, freehand drawing, geometrical and projection drafting, theory of building construction, modelling of buildings.

Senior Class.—(a) *Masons*.—German and business correspondence, arithmetic (percentages, insurance, etc.), free-hand drawing, theory of building construction, architectural drafting, architecture, materials, estimates, surveying, jurisprudence, book-keeping, modelling, first aid.

(b) *Carpenters*.—Subjects generally the same as above for masons, but specially designed for carpenters in the matter of building construction, planning, and modelling.

(c) *Stonemasons*.—As above, but with corresponding variations to suit stonemasons.

ROYAL HIGHER MACHINE-CONSTRUCTION SCHOOL.

GENERAL

The aim of this school is to train men for operating and constructing machines and becoming eventually managers or owners of machine shops. One school provides, also, courses for master workmen and master installators, and has plumbers' as well as advanced evening and Sunday classes.

The building, costing about \$2,000,000, was erected by the city and the annual cost of maintenance is about \$100,000, of which the city defrays about \$34,000, the rest of the cost being borne by Prussia. The building is well equipped with machines of various kinds, but here, as very generally in Germany, they are used for the purpose of illustration. Machines themselves are not made by the students.

The conditions of admission are: (1) Standing of second highest class in a secondary school and two years' practical work, or (2) attendance at the preparatory school and 2½ years' practical work, or (3) military certificate of the one-year "volunteer" class, with two years' practical work and evidence of efficiency in drafting, or (4) certificate of sufficiently high grade from recognized State school, with two years' practical work, or (5) passing a State examination, with three years' practical work.

The day attendance is usually about 300, the evening from 1,200 to 2,000.

For each half-year term the fee is \$25; five times this sum for foreigners.

An initial outlay is necessary of about \$10 for mathematical instruments, and a current expenditure of about \$8 per term for books and materials.

Pupils are insured against accidents on the same terms as in the Royal Building-Trades School.

PREPARATORY SCHOOL.

FIRST TERM.

German: Orthography, grammar, composition.

Arithmetic: Stress laid on rapid mental calculating. Drill on fundamentals.

Curriculum.

Mathematics: Algebra; square and cube root, theory of numbers, equations of first degree. Plane geometry: Triangle, quadrangle, circle, pythagorean proposition.

Physics: Properties of bodies. Expansion, weight, density, gravitation.

Chemistry: The leading conceptions. Properties of air and water. Phosphorus, sulphur. Respiration and combustion.

Geometrical Drafting: Dissection of lines and angles. Measures, circles, regular polygons, etc. Conic sections: ellipse, parabola, hyperbola.

Free-hand Drawing: Sketching of fundamental parts of machines, etc.

SECOND TERM.

The same subjects as above, but more advanced.

TECHNICAL DIVISION

Form IV. (the lowest Form).

Mathematics: Algebra: Involution, roots, logarithms, equations of first degree with one or more unknowns. Exponential equations. Equations of the second degree. Arithmetical and geometrical series. Calculation of compound interest, etc.

Plane Geometry: Calculation of surfaces. The circle. Proportion. Problems.

Solid Geometry: Regular bodies. Prism. Pyramid. Cylinder, cone. Sphere.

Trigonometry: Use of tables. Goniometry. Solution of oblique-angled triangles.

Mechanics: Theory of motion. Statics of solid bodies. Solidity, elasticity.

Physics: Equilibrium and motion of solid bodies, liquids and gases. Theory of heat.

Chemistry: Atomic theory. Treatment of useful metals.

Descriptive Geometry: Constructions of ellipse, parabola, hyperbola. Spirals, etc.

Machines and their parts: Screws. Pipes, etc. Sketching and technical drafting of machines.

Theory of Building Construction: Kinds of stone. Mortars. Window and door openings. Vaulted roofs. Chimneys. Woods and their use in building. Roofs, stairways. Drafting buildings.

Ornamental Writing: Tracing.

Form III.

Mathematics: Series. Convergence and divergence of endless series. Binomial series. Exponential series, etc. Theory of curves.

Mechanics: Dynamics of solids. Theory of solids.

Physics: Optics. Sources, diffusion and velocity of light. Reflection and refraction. Optical instruments. Chemical action of light. Photography.

Descriptive Geometry: Continuation of work of Form IV.

Machines and their parts: Continuation of Form IV. work.

Tool-machines: Construction, various parts, mechanisms for operating. Lathes, boring-machines, etc. Safety devices.

Mining: The leading ores. Pig-iron. Malleable iron. Copper, lead, tin, etc., and how procured. Alloys.

Drafting: Machines and their various parts.

Electrotechnique: Electricity. Currents. Effect of heat. Chemical action. Magnet, etc. Alternating currents. Measurements. Production of electric current. Dynamos.

Theory of Building: Materials and their treatment. Strength of materials. Special drafting.

Form II.

Mathematics: Algebra (continuation of earlier work). Theory of curves, more advanced.

Mechanics: Fluid bodies. Equilibrium and pressure of water, etc. Elastic bodies. Gases and vapours. Chief laws. Steam, its action and application.

Machines: Pumps, etc. Steam engines. Steam boilers.

General Technology: Handling of iron as to its fusibility and ductility, etc. Materials: leather, rubber, emery, asbestos, etc.

Electrotechnics: Accumulators and transformers, etc. Application of electric current. Illumination by electricity. Safety devices.

Construction: Calculation of strength of supporting parts. Distribution of pressure, etc.

Practical work in the laboratories.

Life-saving: First aid to injured, etc.

Form I.

Repetition and Extension: Work in mathematics, mechanics, machine-construction, steam, levers, cranes, electricity, general technology, construction, etc.

Hydraulic motors. Gas motors.

Estimates: Practical exercises in laboratories.

Book-keeping: Practical and theoretical.

MASTER WORKMEN'S SCHOOL OF MACHINE CONSTRUCTION

This school gives less advanced instruction than the Higher ^{Aim.} School and aims at training master workmen, machinists, and operators of smaller plants. It has three classes of a half year each.

The admission requirements are a good elementary school ^{Admission Tests.} education, and at least four years in a work-shop.

For each term the fee is \$7.50; foreigners, as usual, five times ^{Fees.} as much.

In each of the three Forms, the student has 46 to 48 hours per week. ^{Curriculum.}

Form III. (the lowest): German, arithmetic, geometrical drafting, free-hand drawing, geometry.

Form II.: German, arithmetic, projection drawing, experimental physics (properties of bodies, heat, steam, magnetism), experimental chemistry of elementary character, algebra (to equations of first degree), plane and solid geometry, mechanics (motion, solid bodies), machines of all kinds, practical work, mining of materials, construction of buildings.

Form I.: Electrotechnics, mechanics, dynamics of solid bodies, fluid bodies, stability, tool-machines, steam-boilers, etc., steam-engines, water-power machines, gas machines, lifting machines, technology (mines and materials), bookkeeping, making of estimates, technical jurisprudence, laboratory work, first aid and life-saving.

EVENING AND SUNDAY COURSES

Aim, Ad-
mission tests,
etc.

These courses are for pupils who wish to continue their studies after completing the courses in the foregoing schools. Instruction is given in about 35 different subjects.

The fees vary according to number of courses taken: Up to 3 hours per week, 50 cents per hour for term; up to 7 hours per week, 37 cents per hour for term; for each hour over 7, 25 cents.

Classes are held on week-days from 8 to 10 p.m., and on Sundays from 9.15 a.m. to 12.15.

Instruction is given in about 35 different subjects.

COURSES FOR MASTER INSTALLATORS AND GAS PLUMBERS

Aim.

Admission
tests.

Fees.

Curriculum.

Special advanced courses, maintained by the State, are given for the further training of master workmen in the gas, water, and electric plumbing trades. Only those are admitted who have passed a regular apprenticeship, and are at least 24, but not more than 40 years of age. Each course lasts three months, and is divided into a general technical preliminary part lasting four weeks, and a special part lasting eight weeks. The fee for the complete course is \$18.75. The number of hours per week is 48. The preliminary part is the same for all trades; the special course varies according to the trade needs.

The complete course of study for the Higher Machine Construction School includes a preparatory class and five half-year classes. For all the trades the instruction is the same except in the last two terms, when the students specialize according as they are to engage in above-ground or under-ground construction.

AIX-LA-CHAPELLE

GENERAL

Technical
High School.

Small size of
classes.

In Aix-la-Chapelle, besides the Higher Technical School for Textiles, I visited the Technical High School, the School of Mines, and the Art School. The first mentioned is of university rank. Its building is spacious and, as was proudly pointed out to me, it is exceptionally well planned. Like the Faculty of Applied Science at the University of Toronto, which, I may point out in this connection, follows the Prussian, not the English or American system of instruction, it has many laboratories, but no "shops." What struck me in particular was the small number in each class. In fact, the classes in the German technical schools are always small. In

Ontario we must get over the notion that large classes are either a proof or a necessity of efficiency.

At the School of Mines I met the Director only; the session did not begin for some weeks afterwards. The school is equipped with the machinery used in the mines and with plans of mine construction. For some weeks during the year the staff and the students live at one of the mines, and take up the practical side of the course. School of Mines.

The Art School is a very fine one-story building, lighted from above, and having a central exhibition hall, with class rooms opening into it. The arrangement is an excellent one. The course is both the Fine and the Applied Arts. Art School

HIGHER TECHNICAL SCHOOL FOR TEXTILES

GENERAL

The Textile School, which is housed in a large and magnificently equipped building, gives theoretical and practical instruction in the manufacture of woollen goods. Its aim is to train manufacturers, directors, and skilled specialists, and to afford as well an opportunity of obtaining the knowledge necessary for buying and selling the goods. The school also provides for the education of engineers and technicians who wish to devote themselves to the construction of textile machines, or to superintend the plant of textile factories. A Master Workmen's School is carried on, in evening and Sunday classes, for the training of skilled workmen and other employees. Finally, a special branch of the Textile School is devoted to the training of women as cloth-darners, for the correction of defects in weaving. Aim.

Practical training, upon which special stress is laid, is given continuously by the actual filling of contract orders from local and foreign manufacturers. In this way, the pupil is able to learn at first hand the conditions and needs of the trade, and to use the school as a work-shop to make himself proficient in practice. Practical work; Contract Orders.

The conditions of admission are a certificate of satisfactory school education, or, in default of this, an entrance examination in German and arithmetic. Foreigners are required to give evidence of an adequate knowledge of the German language. The minimum age for admission is sixteen. Previous practical training is not demanded, though regarded as desirable. Admission tests.

The pupils are divided into three classes—Regular, Special, and Occasional. Regular pupils take all the subjects of the separate courses; Special pupils take only the practical part; Occasionals attend only lectures, according to individual choice. Classes of Pupils.

Length of
Courses.

Each course covers half a year—from March 1st to August 15th, and from October 1st to March 1st, respectively. Special pupils may enter at any time. Each half-year term consists of about 21 weeks, with 44 instruction hours per week. Instruction is given daily (except Saturday afternoon) from 8 to 12 a.m., and 2 to 6 p.m.

Fees.

The fees are as follows: For Regular pupils—Germans, \$25.00 per term; foreigners, \$125.00 per term. For Special pupils—Germans, \$12.50 per month; foreigners, \$62.50 per month. For Occasional pupils—Germans, \$3.75 per term for 1 hour courses; foreigners, \$12.50 per term for 1 hour courses. Foreigners have to pay in addition an entrance fee of \$15.00. To poor or specially-talented pupils fees may be remitted in whole or in part, at the discretion of the Director of the School.

Examinations.

All class-room materials are supplied by the pupils themselves. The examinations are conducted by a Commission composed of the Director of the School, the Professors in the Department concerned, two representatives of the School Board, and a Government Commissioner nominated by the Minister of Trade and Commerce, the last-named choosing the Chairman. The examinations are held at the close of each term, and are open only to students who have taken complete courses. They are both written and oral. The question-papers are prepared by the Director of the School, but have to receive the approval of the Government Commissioner. The oral examinations cover each subject of the department taken. The questioning is by the teacher of the particular subject, but it is also open to all other members of the Commission to put questions to the candidate. If the Government Commissioner considers that the regulations have been infringed in any way, he may object to the findings of the Examining Commission and lay the matter for final decision before the Minister of Trade and Commerce. Successful candidates receive a Leaving Certificate. Unsuccessful candidates are allowed to repeat the examination only after having taken another full term's work. All other students receive only an official statement of the length of their attendance. In 1908 the total attendance was 286, of whom 47 passed the examinations for complete courses.

Leaving
Certificates.

Organization.

The school is organized in four departments: Spinning, Weaving, Dyeing, and Finishing, each complete in itself. The courses of instruction are as follows:—

SPINNING DEPARTMENT

Curricula.

In the spinning-school instruction is given in the production of simple yarns, as well as twisted and art-yarns. Attention is devoted chiefly to the

woollen industry, the treatment of other spinning-materials being taken up as far as is consistent with the chief end in view.

The subjects and hours of instructions are: Spinning (theory) (8), materials (2), special arithmetic and bookkeeping (2), weaving (theory) (2), chemistry and dyeing (4), general machinery instruction (3), drawing and sketching (4), jurisprudence (2), practical work (17).

Some of the details are as follows:

Spinning and Willowing of materials of varying quality and colour. Combing in its different processes. Fine spinning and its machines. Yarn-twisting; spools, machines for the different processes and for saving of waste. Use of the yarns; choice of materials; causes of faults, and their prevention.

Theory of Materials: Various kinds of spinning fibres. General qualities of wools. Special kinds and their application. The principal wool-producing countries. Characteristics of their products. Sorting of wools. Washing and the machines for that purpose. Various drying-systems. Disentangling of wool by chemical and mechanical processes. Art wool and its preparation.

Special Arithmetic and Bookkeeping: Calculations occurring in the preparation and combining of parts. Calculation of weights and quantities, twists and products, values. Office bookkeeping. Equipment and methods.

WEAVING DEPARTMENT

Weaving (theory): Definition and division of fabrics. Preliminary operations. Weaving. Hand and machine looms. Description of materials according to substance, colour, etc. Colour-effects, faults, strength tests. Chief manufacturing centres for the various materials.

Chemistry and Dyeing: Elements of chemistry. Acids, alkalies, salts. Discussion and valuation of materials used in textile industries, such as water, fixing materials, soaps, washing and fulling materials, oils, fats, etc. Chemistry of textile fibres. Chemical methods of refining. Various bleaching and dyeing processes. Preparation, character and application of the various colours. Effects of the processes of washing, fulling and dressing upon colours and fibres. Determination of proportion of wool and cotton in mixed goods. Dyeing and pressing machines.

General Theory of Machinery: Elements of mechanics. Transmissions. Prevention of dissipation of energy. Steam boilers, firing, sheathing, testing, coal-saving. Steam-driven machines, water-engines, gas motors, electricity, its theory and application. Factory buildings, their heating, lighting, ventilation, etc.

Drawing and Sketching: Sketching of machines and their parts. Drawing of plant for textile manufactory.

Jurisprudence: The chief laws concerning industry. Conditions of workmen, Sunday laws, inspection, courts, life and accident insurance, regulations for the prevention of accidents, the welfare of the workmen.

Practical Work: Keeping of the machines and combs. Mixing, willowing. Care of the machines in operation. Work in chemical laboratory. Analysis of materials used, such as oils, glues, water, dyes, soaps, etc.

DYEING AND FINISHING DEPARTMENTS

The courses of study detailed above for the departments of Spinning and Weaving are typical of the departments of Dyeing and Finishing, each department devoting special attention to its special subjects.

UNITED STATES

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UNITED STATES

INTRODUCTION

In the United States there are two classes of schools—Grammar and High—both called Public Schools. Generally, however, they are not standardized as in Ontario. Some States, it is true, have established systems in greater or less detail, but local control is exercised to a far greater extent than in any of the Provinces of Canada. Accordingly, schools may be of the same general character though different in many details. Besides the Public Schools, there are also a large number of private schools, especially of the secondary grade. In some of the older States the latter hold the place for many years held in England by such schools as Rugby, Eton, and Harrow. Moreover, a good deal of the present provision for industrial education in many of the States has been made by private individuals. As in Ontario with household science in the case of Mrs. Massey-Treble, of Toronto, and in Canada with manual training and school gardens in the case of Sir William Macdonald, of Montreal, the newer movements in education are generally introduced by philanthropists and maintained by them until adopted into the public systems. School Systems.

The conditions in the United States more closely resemble those in Ontario than do the conditions in the European countries I visited. I have, accordingly, given special attention to their schools for industrial purposes.

TECHNICAL EDUCATION*

About the middle of the nineteenth century evening classes were opened under private auspices at half a dozen centres, chiefly in connection with Mechanics' Institutes. Although there was then a demand for technical instruction on the part of the workers, it is only of late years that these classes have provided courses with an industrial outlook. The next important advance took place in the period of mining and railroad expansion which followed the Civil War and which led to the establishment of engineering schools and institutes of technology. At first, as in the case of the foregoing evening classes, these institutions were provided at private expense; but the large grants of land made to the States under the Morrill Act of 1862 for the support of instruction in agriculture and mechani- Mechanics' Institutes. Morrill Act.

* For much of the material in this historical outline I am indebted to "Some Notes on the History of Industrial Education in the United States," by Charles R. Richards, Director of Cooper Union, New York, in the Report of the Committee on the Place of Industries in Public Education, submitted to the National Education Committee, in July, 1910.

cal arts resulted in the establishment of engineering departments in most of the western colleges and universities.

Manual
Training.

The Manual Training School of Washington University, St. Louis, founded in 1880, was the first serious attempt to introduce industrial training into the schools. It was rapidly followed by manual training classes in other cities, some on a private foundation and others as part of the public system. But it was not until the years between 1887 and 1890 that manual training was introduced into the Grammar (our Public) Schools. Beginning with wood and iron work in the upper grades, this subject is now represented in the schools of many municipalities. At first manual training was advocated for the Grammar and High Schools on purely cultural grounds. During the last four or five years, however, as a result of the growing emphasis on the social side of education, the conception of manual training in the Grammar Schools has come more and more to be "that of an educative instrument interpreting the fields of art and industry in terms adapted to the life of the child and the limitations of the school." In the High Schools, however, whether hand-work shall be cultural or vocational or both appears to be as yet an unsettled question. In the Report for 1910 of the Committee of the N. E. A. on the place of industries in public education two main classes of schools are recognized, the Manual Training High School and the Technical High School, which are defined as follows, in the terms I use in my General Introduction:—

In the
Grammar
Schools.

In the
High Schools.

Manual
Training and
Technical
High Schools.

The Manual Training High School is one in which a greater or less amount of hand work is taken up and in which the greater part of the academic instruction is like that found in other High Schools, none of the instruction being especially planned to be of direct vocational service; and

The Technical High School, on the other hand, is one for the preparation of pupils for positions in industrial life which require skill and technical knowledge and are of greater importance and responsibility than those of skilled mechanics. The instruction deals both with manual operations, and with such direct application of the principles of science and mathematics to industrial work as will enable the student to master the fundamental processes and problems of the industries dealt with in the School; but the instruction is not narrowly vocational.

Such schools, however, usually form elective departments of High Schools; not many have been separately established. Moreover, there are few, either schools or departments, to which the definition of a Manual Training High School can be properly applied. Most have an outlook more or less industrial.

INDUSTRIAL EDUCATION

Of the Public Schools which make definite efforts to train workers there are three classes—the Trade School, the Intermediate Industrial School, and the Part-time Co-operative Trade School.

I. TRADE SCHOOLS

The Trade School is designed to train apprentices for a particular trade. It aims to give such preparation as shall abolish the drudgery and waste of the student's time in the shop by supplying him in school with an economic instruction in the practical work and in the necessary theory of the trade. In some trade schools academic instruction is given as well, but the amount of both this and the theory varies greatly in different schools.

The New York Trade School was founded in 1881, but in the first twenty years thereafter only three other important schools were established, all being well endowed. Since 1901, about ten or twelve additional schools of this class have been established and maintained by private individuals or by municipalities, with, in addition, a number of commercially conducted schools in the building and other trades. In 1907 the Milwaukee School of Trades, already a year in operation at private expense, was taken over by the City, and since then public trade schools have been established in Philadelphia, Pa.; Portland, Ore., and Worcester, Mass., and in New York and Boston (for girls).

Professor Richards' estimate of the situation I give in his own words; it is to us in Ontario of great importance as it sets forth the two main economic obstacles to the successful establishment and management of a general system of trade schools:—

Such schools are still in the experimental stage. They face grave economic problems that are still unsolved:

First among these is the problem of support presented to the student worker during the period of instruction. This difficulty serves to restrict the number that can take advantage of such schools to the comparative few. Training for the skilled trades is in common practice restricted to the period above 16 years of age, and as the great bulk of the youth who will form the mechanics and industrial workers of the country must of necessity enter upon remunerative work at sixteen or shortly after, the sacrifices necessary to permit attendance at a trade school can be expected only in cases of exceptional foresight and home conditions above the average.

The second aspect of the economic problem in relation to such schools is found in the large expense of administration, instruction, materials, and physical maintenance in proportion to the number of students that can be instructed.

II. INTERMEDIATE INDUSTRIAL SCHOOLS

During the last three or four years a new and important class of school—the Intermediate Industrial, General Industrial, or Preparatory Trade, as it is variously called—has come into existence for boys and girls from 14 to 16.

To quote Professor Richards again:—

The idea has been gaining ground that one of the greatest needs of industrial education is to provide a school training for those who expect

to enter the industries at sixteen that will give a sound basis of general principles and a wide acquaintance with materials and processes, and so make possible the development of industrial intelligence and, consequently, of industrial adaptability.

The aim of such schools is not a specialized trade training, but such instruction in the processes fundamental to several trade groups as will give an advantage to the boy of sixteen, whether it be to enter upon the work of mill or factory or to take up the task of learning a skilled trade.

Character of
work.

This Intermediate Industrial School prepares boys and girls for entrance to the trades. Such schools place greatest emphasis on practical work under conditions resembling as closely as possible those prevailing in commercial practice. The academic work is also closely related to the practical work and little is taken up that does not bear ultimately on the trade work. But, of this class of school there is already a number of varieties, some providing specialized courses in addition to the general ones, in accordance with the necessities of their localities.

Number.

Intermediate Industrial Schools have been established as part of the public school system in New York City, Rochester, Albany, Springfield, and New Bedford. The expectation is that this type of school will go far to meet the situation created by specialization which has rendered it difficult and often impossible for the worker to become more than a cog in the industrial wheel.

III. PART-TIME CO-OPERATIVE SCHOOLS

Aim.

The Part-time Co-operative School plan is an attempt to combine practical training in a manufactory with general and technical instruction in a school. The plan was first tried in the Faculty of Applied Science of the University of Cincinnati, where it has been in successful operation for several years. During the last two or three years it has been applied also to pupils of the

Organization.

High School grade. The details of such co-operative systems vary according as the boy comes from the shop to the school or goes to the shop from the school. Thus, in Cincinnati, a group of machine-shop apprentices are given about 4 hours' instruction per week in the schools, while in Pittsburg, Beverley, and Fitchburg, selected groups of High School boys are given a week in the shop and the school alternately. As I have already reported, in Munich and other parts of Germany the industrial training of apprentices is similarly provided for.

GENERAL SITUATION

Not much
progress.

Speaking generally, therefore, although certain types of industrial schools have established their claims to a place amongst the Public Schools of the United States, others are still in the experi-

mental stage. Moreover, the very general opinion held in Ontario that the United States has for a considerable number of years been making great progress in industrial education does not appear to be justified by the facts. Some States and some smaller communities have, it is true, recognized the necessity for this education, and, through private initiative and philanthropic effort, a more extensive provision exists than the State legislation would indicate; but from what I heard at the Milwaukee Conference in December, 1909, I judge that, in the United States, much remains to be done before the necessity for industrial training at the public expense becomes generally recognized. As a matter of fact, also, from the standpoint of actual realization, the practice is still far behind the legislation. This opinion is strengthened by the statement of the Director of the Bureau of Municipal Records, Philadelphia, Pa., published in the Report for 1910 of the Committee on the Place of Industries in Public Education, already referred to. The Director states the situation thus:—

Extent of
provision.

About one-half of the thirteen hundred city and town school "systems" in the United States have introduced, somewhere in their curricula, various forms of constructive activity denominated handwork, or manual training. In only one hundred and fifty of these cases, however, does the handwork extend through all of the grades of the elementary schools, and in only about one hundred cases into the High Schools. Of the six hundred school systems having manual training, three hundred give less than an hour a week to it; and only thirty-seven devote as much as half an hour a day to the subject. . . .

There are about one hundred and fifty schools of secondary grade in the country that are classified in the reports of the Commissioner of Education as manual and industrial training schools. Of this number, however, only one-half are reported as giving any attention to the manual arts. Thirty of these are public high schools; most of which devote from five to nine hours a week to manual, technical, and industrial instruction. Some give as little as four hours a week; but fewer than half of them give as much as one-third of their time to such instruction. With two or three possible exceptions, none of these public high schools may be ranked as technical high schools, the distinctive industrial or vocational purpose being almost uniformly absent.

The Director adds that the handwork in the elementary schools is still, in the main, abstract, isolated, impractical and unrelated to social conditions. • Within the last few years, however, the demand for industrial education has made itself felt even in the elementary schools, and, as I have pointed out, a number of public intermediate and trade schools of a distinctively vocational type have come into existence.

Character of
the School
work.

In a country like the United States with a population of nearly 92,000,000, the foregoing record is certainly a meagre one. No one questions the necessity for such schools. The movement

Causes of
situation.

appears to have lacked leadership; until the publication of the report of the Massachusetts Commission, no competent organization of the subject was attempted.

LEGISLATIVE ACTS

Favourable
trend of pub-
lic opinion.

That there is a marked trend of public opinion in the direction of industrial education at the public expense is clear from the legislative enactments by various States. Probably the most advanced and suggestive Acts have been passed by the Wisconsin, Massachusetts, and New York Legislatures.

Wisconsin.

The schools to be established under the Act in Wisconsin are trade schools intended to produce skilled workmen rather than to give any special or extended industrial course along with academic work. The School Board is in control; but it may appoint an Advisory Committee, consisting of five members, not members of the Board, each of whom is experienced in one or more of the trades taught in the school. The Act provides also for a special annual assessment, not exceeding half a mill, to be used in establishing and maintaining a trade school. A check on the establishment of such a school by the School Board against the wishes of the community is maintained by the provision that the question must be submitted to a vote of the electors of the municipality upon a petition of twenty per cent. of the voters at the last election.

Wisconsin has also provided for the establishment and maintenance of departments of Manual Training in High Schools and in the upper grades of the Grammar schools; the State aid being equal to one-half of the amount of local expenditure, the maximum aid being \$250 for Manual Training in High Schools and \$350 for Manual Training in High Schools and upper grades of Grammar Schools. Total annual expenditure for State aid, \$25,000. In this State the industrial movement is in its infancy. Wisconsin has also established a State Mining Trade School, to teach the science, art, and practice of mining, and the application of machinery thereto.

Massachu-
setts.

Under the Massachusetts Act, Industrial Schools must be established independently, in order to secure their freedom from the adverse influences of the academic teacher of the older type. The State Board of Education has general charge of these schools; it may initiate and superintend their establishment and maintain them with the co-operation and consent of the municipality concerned, and any money contributed by the State or the municipality shall be expended under its direction. Day schools, evening schools, and part-time schools are provided for. The Act provides also for a report upon the desirability of establishing one

or more technical schools or industrial colleges with a three or four years' course for extended industrial training.

The Act of the State of New York provides for the establishment and maintenance of the following:—

1. General Industrial Schools, open to pupils who have completed the Elementary School courses and are fourteen years old.
2. Trade Schools for those who are sixteen and have completed the Elementary School courses or the general Industrial course, or have met the requirements of the School Board; and
3. Schools of Agriculture, Mechanic Arts, and Homemaking for those who are fourteen years old, who have completed the Elementary School courses or have met other requirements of the School Board.

Under this Act, the School Board has control, but it is required to appoint an Advisory Committee of five members, representing the local trades, industries, and occupations, to consult with and advise it. State grants are also provided on the fulfilment of certain conditions. This industrial system is intended to be flexible enough to provide for those who can attend school all day; for those who must work part of the time to earn a living but can afford to go to school part of the time; and for those who must work all day but can attend an evening school.

REPORT OF THE MASSACHUSETTS COMMISSION ON INDUSTRIAL EDUCATION

The State of Massachusetts has been the first in the Union to undertake systematically the work of providing for its manufacturing interests a body of workmen, skilled not only in the practical but the theoretical branches of their work. A statement of the situation in the United States would be incomplete without some consideration of the epoch-making Report of the Commission on Industrial and Technical Education, appointed in 1905. The Commission held an enquiry with regard to the leading industries of the State and heard a large number of witnesses. Its first report, published in 1906, is at present the most potent factor in the reorganization of industrial training of the United States, and its conclusions and recommendations are well worth the serious consideration of the people of Ontario; in my judgment, they apply, *mutatis mutandis*, to Ontario as well:

The Commission points out that, in the past, special training for vocations was provided by the system of apprenticeship, and that the two systems of training by school and apprenticeship went on concurrently, but as the system of apprenticeship became decadent, special training for vocations took its place, first in the Schools of Theology, of Medicine, and of Law; then in the Normal Schools

Importance
of the Report.

Causes of pre-
sent situation.

and later in the Technical Schools for Engineers. Moreover, that, in the case of every calling, the school training gradually absorbed more and more time, and came to be the only training for the child, thus producing a one-sided system of education.

Following is a synopsis of the commission's report:

PRESENT CONDITION OF INDUSTRIAL TRAINING

All the callings in life for which children and youth need to be specially prepared may be roughly grouped into four classes—professional, commercial, productive, and domestic.

Provision for
the different
callings.

Of these, the professional callings are sufficiently provided for, partly at public and partly at private expense. A large part of the burden of high school maintenance is incurred in the interests of professional callings.

The activities which may be classed as commercial, including all that have to do with the processes of distribution and exchange, are provided for largely at the public expense. The schools send out salesmen, clerks, bookkeepers, typewriters, and stenographers in ever-increasing numbers. Their occupations are the ones which allow clean hands and good clothes. If anything is lacking in this business training, it is special education in the principles and practice of expert salesmanship. A beginning of such instruction has been made in Boston.

Turning to the occupations engaged in production, in distinction from distribution, we find that these are only touched on educationally in their most advanced and scientific forms. No instruction whatever is furnished at public expense in the principles or practice of farming, dairying, gardening, the building trades, cabinet-making, machine shop practice, boot and shoe making, tanning, printing, bookbinding, dressmaking, millinery, embroidery, design.

(An Agricultural College has been established at Amherst, but the High Schools do not prepare for it. Manufacturing has been recognized by State grants to the Massachusetts Institute of Technology and the Worcester Polytechnic Institute—institutions intended for the training of men in the highest ranks of productive industrial life. It has been recognized still further in the recently established textile schools at Lowell (1897), New Bedford (1899), Fall River (1904), and in a few others established since the report was issued.)

CONCLUSIONS

The wasted
years of
adolescence.

1. For the great majority of children who leave school to enter employments at the age of 14 or 15, the first three or four years are practically waste years so far as the actual productive value of the child is concerned, and so far as increasing his industrial or productive efficiency. The employments upon which they enter demand so little intelligence and so little manual skill that they are not educative in any sense.

For these children, many of whom now leave school from their own choice at the completion of the seventh grade, further school training of a practical character would be attractive, and would be a possibility if it prepared for the industries. Hence, any scheme of education which is to increase the child's productive efficiency must consider the child of fourteen.

Lack of
industrial
intelligence.

2. Children who continue in school until sixteen or eighteen, especially if they complete a high school course, are able to enter upon employments of a higher grade, usually in mercantile pursuits, and they are able by reason of greater maturity and better mental training to learn the technique of their employment in a shorter time; but they are wholly lacking in

manual skill and in what we have called industrial intelligence. For the purpose of training for efficiency in productive employments the added years which they spend in school are to a considerable extent lost years.

In the cases of both classes of children the employment upon which they enter on leaving school is determined by chance.

3. The productive industries of the State, including agriculture, manu- Qualification of workmen.
factures, and building, depend mainly upon chance for recruiting their service. A few apprenticeships still exist in a few industries or parts of industries, but very few apprentices are indentured, and many so-called apprenticeships are falsely so named.

The knowledge and skill which the new men bring to the service of any industry is only what they have picked up in a haphazard way. Some bring much and many bring little.

4. This condition tends to increase the cost of production, to limit the Effects of lack of skill.
output in quantity, and to lower the grade in quality. Industries so recruited cannot long compete with similar industries recruited from men who have been technically trained. In the long run that industry, wherever in the world it is located, which combines with general intelligence the broadest technical knowledge and the highest technical skill, will command the markets of the world.

5. The industries of Massachusetts need, in addition to the general Requirements of the industries and the State.
intelligence furnished by the public school system and the skill gained in the narrow fields of sub-divided labour, a broader training in the principles of the trades and a finer culture in taste as applied to material, workmanship and design. Whatever may be the cost of such training the failure to furnish it would in the end be more costly.

6. The State needs a wider diffusion of industrial intelligence as a foundation for the highest technical success, and this can be acquired only in connection with the general system of education, into which it should enter as an integral part from the beginning.

7. The investigation has shown the increasing necessity for a woman Women's occupations.
to enter the industrial world for the sake of self-support, and hence that she should be prepared to earn a respectable living wage, and at the same time that the attempt should be made to fit her so that she can and will enter those industries which are most closely allied to the home.

The investigation has shown that the vocation in which all other women's vocations, have their root, namely, the care of the home, has been overlooked in the modern system of education. In order that the industrial life of the community may be vigorous and progressive, the housekeepers need to be instructed in the laws of sanitation, in the purchase, preparation and care of food, and in the care of children, that the home may be a home and not merely a house.

(In a number of centres provision is now made in the foregoing subjects.)

RECOMMENDATIONS.

1. That cities and towns so modify the work in the Elementary Schools Manual training in Elementary Schools.
as to include for boys and girls instruction and practice in the elements of productive industry, including agriculture, and the mechanic and domestic arts, and that this instruction be of such a character as to secure from it the highest cultural as well as the highest industrial value; and

2. That the work in the High Schools be modified so that the instruction Application of studies to practical life in High Schools.
in mathematics, the sciences, and drawing shall show the application and use of these subjects in industrial life, with especial reference to local industries, so that the students may see that these subjects are not designed primarily and solely for academic purposes, but that they may be utilized

for the purposes of practical life; that is, algebra and geometry should be so taught in the Public Schools as to show their relations to construction; botany to horticulture and agriculture; chemistry to agriculture, manufactures and domestic sciences; and drawing to every form of industry.

The Commission also recommends:—

Elective High
School industrial
courses.

1. That all towns and cities provide by new elective industrial courses in High Schools instruction in the principles of agriculture and the domestic and mechanic arts;

Evening
Classes.

2. That in addition to day courses cities and towns provide evening courses for persons already employed in trades and

Part-time
Day Classes.

3. That provision be made for the instruction in part-time day classes of children between the ages of 14 and 18 years who may be employed during the remainder of the day, to the end that instruction in the principles and the practice of the arts may go together.

SCHOOLS VISITED

Of the schools for industrial purposes which I visited in December, 1909, and May, 1910, I have selected the following for special description on account of the suggestive and generally typical character of their organization:

Trade schools.

The Milwaukee School of Trades, the New York City Trade School, the New York City Hebrew Technical Institute for Boys, the Baron de Hirsch Trade School, the Manhattan Trade School for Girls, the New York City Hebrew Technical School for Girls, the Boston Trade School for Girls.

Intermediate
Industrial
Schools.

The New York City and Springfield Vocational Schools and the Worcester Independent Industrial School, to which I add an account of the Albany Vocational School and the Rochester Shop Schools, based on facts obtained by correspondence.

Co-operative
Schools.

The Co-operative Industrial Department of the Fitchburg High School, to which I add an account of the Vocational School established at Beverly, based on facts obtained by correspondence.

Technical
High Schools.

The Springfield Technical High School, the Stuyvesant High School, and the Boston Girls' High School of Practical Arts.

I add an account of the Boston High School of Commerce and of the Correspondence-Study School of Madison University.

I. TRADE SCHOOLS

MILWAUKEE SCHOOL OF TRADES, WIS.

GENERAL

Under an Act of the Legislature of the State of Wisconsin, the Milwaukee School of Trades, which had been founded in 1906 by the Merchants' and Manufacturers' Association, became part of the school system of the city in July, 1907, at which date the Act came into effect. This school is the first trade school in the

United States to be sustained by a special municipal tax levied for industrial education. It provides instruction for young men between the ages of 16 and 20 in the practice and fundamental principles of the manufacturing and building trades. The school does not claim to turn out journeymen. Its aim is to instruct its students so that on graduation they may be of practical value to their employers and receive fair remuneration. Each course is intended to be the equivalent of an apprenticeship of four years. For each trade, the course is a two years' one of 52 weeks per year and 44 hours per week, except in the case of the plumbing trade, for which half the above time is required. Early in the present year, I may add, a School of Trades for Girls was also established.

Special
Municipal
Tax.

Aim.

The school building, both outside and inside, looks like an ordinary factory, and it was so originally. It makes no architectural pretensions, and its equipment, which is excellent and complete, is of the factory character. Besides shops and class-rooms for the different trades, an "Exhibit Room" is provided which contains samples of work of interest and value in each trade. This notable feature of the equipment is a help and an inspiration to all, including visiting parents and the boys who have not yet chosen their trade. I have already called attention to the existence of similar museums in the European schools.

Accommo-
dations.

Exhibit Room.

When I visited the school in 1909 it provided instruction in pattern-making, machinist and tool making, carpentry and joinery, plumbing and gas fitting. Moreover, its prospectus states that when a sufficient number present themselves to form a class, instruction in other trades will be provided.

Departments.

The school aims at placing the student in conditions as nearly as possible like those he will meet with in actual practice. The hours are accordingly, from 8 to 12 and from 1 to 5 daily except Saturday. On Saturday there is a session from 8 to 12. The evening classes are from 7.30 to 9.30, four days a week, from the 1st of October to the 30th of April. The course of instruction in each trade includes the following branches:—

Day Courses.

1. *Shop Practice and Trade Lectures.*
2. *Drawing:* Freehand, mechanical; isometric, problems in design, architectural.
3. *Workshop Mathematics:* Arithmetic, algebra, geometry, trigonometry.
4. *Shop Inspection Trips:* In connection with each trip, a carefully written report must be submitted.
5. *Practical Talks and Lectures* on subjects connected with each trade and topics fundamental to all trades.

About one-fourth of the student's time is devoted to academic instruction incidental to his trade, the remainder of the time being

spent in actual shop practice. The school, however, provides no cultural classes.

Admission tests.

To qualify for admission, the students must be sixteen and be able to read and write English and perform the fundamental operations of arithmetic. Special preparatory classes in the City High Schools are in contemplation. At present boys below sixteen and in attendance at the High Schools are allowed to pursue those studies which will be most helpful to them when they enter the School of Trades.

Evening Classes.

The evening classes supplement the experience of apprentices and workmen who are employed during the day, but the course is such that none except students of unusual ability can serve the entire school apprenticeship in evening classes alone.

Fees.

The cost of maintenance is approximately \$225 a year for each pupil. For residents of Milwaukee who are not over twenty years of age, the school is free. For all others the day classes are \$15 a month, and the evening classes, \$4. Students receiving free tuition are charged for the materials used in their trades as follows:—

Day pupils in pattern making, machinist, tool making, and wood working trades, \$4.00 per month.

Day pupils in plumbing and gas fitting trade, \$5.00 per month.

All students admitted are considered to be on one month's probation, but, if necessary, a longer period may be allowed.

Controlled by Advisory Committee.

The school is under the immediate control of an Advisory Committee called "The Committee on Trade Schools," as provided in the Legislative Act.

The following are the details of the courses of study:—

CURRICULUM

Patternmaking

Instruction in the proper use and care of tools and machinery.

Lectures on pattern making materials; laws governing warping and cracking; talks on protective coatings for patterns.

Instruction in allowance needed for draft, shrinkage, finish, shake, and warp.

Especial attention is given to the intimate relation which should exist between pattern shop and foundry. No pattern is begun without first thoroughly studying all the interests involved in its use in the foundry. If it is a pattern for a casting upon which machine work is to be performed, its interests in that shop must also be considered.

The shop work includes the application of all the principles given in lectures and shop talks. Carefully graded problems are given the apprentices, from simple exercises to develop skill in the use and control of their tools up to the most difficult work likely to be met with in pattern making.

Some of the problems given are as follows:—

Small rectangular patterns for solid and hollow castings. Ribbed surface plates. Built up patterns, including choice and preparation of stock. Pipe fittings. Valves. Patterns involving auxiliary patterns. Steam and gas engine patterns and core boxes. Patterns for electrical machinery. Patterns for steam pumps. Spur, bevel and worm gears. Fly wheel and pulley patterns. Sweeps for loom work. Miscellaneous patterns and core boxes.

Each student must test all his earlier patterns for draft, shrinkage, and finish, by making moulds from them and forming the castings with molten metal.

The school offers especial advantages to its students in pattern making by supplying opportunities for the further study and criticism of their work when the castings from their patterns are received from the foundry to be worked upon in the machine shop.

Machinemaking and Toolmaking

Instruction is given in the use and care of the different machine tools, and the manipulation of tools for precision measurements.

The following work is then taken up:—

Lathe Work: Plain cylindrical turning and boring. Taper turning and boring. Thread cutting of all standard threads. Chucking and face plate work. Boring with boring bar. Mandrel work. Use of steady rest, cat heads and follower rest. Running, shrinking and pressing fits.

Drilling and Boring: Guiding drills. Drilling within desired circle. Countersinking and countercoring. Laying out work. Methods of clamping work on drill press table. Special uses of drill press.

Planer Work: Plain surfaces at varying angles. Methods of holding irregular work. Planing curved surfaces. Planing dovetails and ways of lathes. Special planer work.

Shaper Work: Advantage of shaper over planer in special work. Cutting keyways. Cutting to a shoulder. Clamping and chucking work. Special shaper work.

Milling Machine Work: Care of milling cutters. Cutting speeds and feeds. Methods of holding cutters. Milling operations. Indexing. Spiral work. Use of special attachments.

Gear Cutting Work: Proportions of gear teeth. Rules for spur-gear calculations. Bevel gears. Worm wheels and worms. (Each student prepares his own gear blanks.)

Machine Grinding: Selection of grinding wheels. Wet and dry grinding. External and internal grinding. Surface grinding.

Bench and Vise Work: Chipping, filing, scraping, fitting, assembling.

Tool Making: Taps. Dies. Cutters. Reamers. Counterbores. Twist Drills. Milling Cutters. Special tools. Dies and Punches. Jigs. Gauges.

Note.—All tools made by apprentices include every step from the securing and annealing of stock to the tempered and ground tool.

Carpentry and Woodworking

The work done in this trade consists of instruction in carpentry, joinery, cabinet making, stair building, and mill work; the aim being to give each graduate in this course a thorough foundation in all the fundamental processes of wood working.

Hand Tools: Instruction is first given in the use and proper care of the hand tools used in the trade. Students are started at once upon the basic exercises as follows:—

Six kinds of lap joints. Nine kinds of mortised and tenon joints. Four problems in graining. Seven problems in dovetailing.

Ornamentation: Fluting, straight work. Fluting, circle and segment. Reeding, straight and circular design. Chamfering, stop chamfers, O.G. and other designs. Special design in plain relief carving, etc.

Mill Work: Plank frames for brick and frame houses. Box window frames for brick and frame houses. Vestibule entrance frames, side light, etc. Porch and cornice work. Exterior decoration. Interior finish, doors, wainscoting, china closets, etc. Instruction in the manner of laying out the work. Billing same for cutters and assembling and finishing. Special designs in sash, etc. Store fronts.

Framing, etc.: Balloon framing. Timber framing. Making timber joints. Rafter framing. Truss framing. Laying joist and framing headers, etc. Setting of partitions, etc.

Cabinet Work: Making cabinets. Bank fixtures. Hardwood mantels. Veneering and fancy goods. Inlaid work, etc.

Stair Building: Mode of laying out ordinary straight stairs. Laying out winders. Laying out circular and elliptical stairs. Kerfing stringers. Laminating stringers, risers and other bent work. Method of laying out and working hand railing for platform, quarter turn and winding stairways.

Mill Machinery: Instruction in the use of saws, planers, moulders, jointers, mortisers, tenoners, and other machines in connection with all classes of wood working, giving in detail the manner of making and tempering knives, setting up and caring for machines.

Plumbing and Gas Fitting

After an explanation of the names and uses of the various tools and materials used in the plumbing trade, the students are immediately set to work on the following:—

Problems: Sheet lead seams. Over-cast joints. Cup joints. Five-eighth inch round and branch joints; horizontal, upright and vertical. Calking and making joints on cast iron soil and drain pipe. Stop cock. Soldering nipples, large and small. Two-inch ferrules. Bath plugs. One and one-quarter inch round and branch joints, horizontal and upright. One and one-half inch round and branch joints, horizontal and upright. Floor flanges. Wall flanges. Quarter bends. Half S traps. S traps. Four-inch ferrules, horizontal and upright. One-half inch round and branch joints, horizontal and upright. Five-eighths inch round joint, oblique. Five-eighths inch round joint, overhead. Plain bibb vertical branches. Two inch round and branch joints, horizontal, upright, and vertical. Two-inch short bend with ferrule. Four-inch short bend with ferrule. Four-inch drum trap. Tank seams, horizontal and upright.

Setting up and Connecting: Sinks, lavatories, boilers, hot water tanks, laundry trays, laundry stoves and heaters, urinals, closets, bath tubs, hydraulic rams, kitchen ranges for gas, coal or wood fuel, automatic cellar drainers, pitcher pumps, wall and horizontal force pumps, hydrants, Ruud instantaneous water heaters, special galvanized iron boilers, regular galvanized iron boilers. The installation of plumbing fixtures in erected sections of city and country residences, supplied by direct and tank water pressure systems.

Lectures: On the following subjects:—

Systems of installation and ventilation. Trapping and venting of drain, soil and waste pipes. Supply pipes. Boilers. Tanks. Fixtures. Trapping of fixtures. Pumps. Water supply for country houses. Disposal of sewage in country houses. Estimating on contracts. State sanitary laws applicable to plumbing.

Gas Fitting: At the close of the plumbing course the necessary time is taken for instruction and practice in gas fitting.

Mechanical Drawing

A thorough course is given in Mechanical Drawing, based on the special needs of each trade. The school furnishes each student with a drawing board and T square, but he must supply his drawing instruments.

Instruction is given by lectures, by means of specification sheets prepared in blue print form, and by notes prepared by the drawing instructors and printed by neostyle. Most of the instruction is individual. Students are urged to do as much home work as possible, such as making tracings and inking in their drawings which have passed inspection.

A course in each trade leads up to practical problems in original designs peculiar to that trade.

Since, practically, fifty per cent. of the value of a pattern maker to his employer rests on his ability to interpret correctly blue prints and working drawings, the apprentices in this trade are given special practice in interpreting working drawings.

Workshop Mathematics

After a thorough review, which demonstrates to the pupil and the instructor the ability of the former for this important branch of his trade, the apprentice is lead, by the solution of practical problems, through the necessary portions of arithmetic, algebra, geometry, and trigonometry. These subjects, when presented to pupils in the abstract, are frequently beyond their mental grasp, but when connected with trade practice their absolute necessity becomes plain. The student then attacks the problem from a new standpoint and with renewed vigor, and succeeds in mastering the difficulties.

All the problems in this branch of apprenticeship, also, are specially prepared by the instructors and printed by neostyle. Much of this work is required to be done by the students as home study. Lectures and shop talks supplement the workshop mathematics.

NEW YORK CITY TRADE SCHOOL

GENERAL

The purpose of this "short course" trade school is to provide instruction for young men between the ages of seventeen and twenty-five who have either been already engaged in trade or who desire to learn one. This was the first school of its type and, in fact, the first trade school of any kind to be established in the United States. Its founder, the late Colonel Auchmuty, himself an architect by profession, was one of the first to realize the fact that the ineffectiveness of the apprentice system in the building trades

made it necessary to provide institutions which would combine trade instruction with work in the shop.

"Auchmuty" System. "Auchmuty system," and originated with the founder. For each trade, a course of instruction is provided in the practical and theoretical branches. The course specifies a series of exercises in manual work which each student is required to execute and complete, and which are so graded that the student acquires facility in the handling of tools and a knowledge of the processes of his trade. The teachers, of whom there are about thirty, are expert mechanics.

Qualifications of Teachers.

As I have elsewhere stated, this is a trade school pure and simple. Even in drawing, for example, the student is taught merely to read plans and blue prints; he is not taught to make drawings himself.

Day and Evening Classes.

Both day and evening classes are provided, and a certificate is granted on the completion of the course. The day classes last for one term of four months, and the instruction is given from 8.30 a.m. to 4 p.m. every day. A young man who possesses the necessary aptitude and education can complete the day course in one term. The evening classes last for a term of six months, meeting three or four evenings a week for two and a half hours each evening. For a certificate the average student usually attends three terms, but these may be reduced to two when he is able to complete the course in that period. Last session 172 attended the day classes and 516 the evening classes. As its prospectus states, this school is not a money-making or charity institution, nor is it conducted in the interest of or in opposition to any organization of master or journeymen mechanics.

Certificates.

Products.

The work done by the students is not used in any way for the pecuniary advantage of the school.

Fees.

The fees for the evening classes range from \$12 to \$16, and for the day classes from \$25 to \$45 a term. The difference between the amount of the fees and the cost of maintenance is made up by the income from an endowment of \$500,000 and by donations. The cost of maintenance in 1909-1910 was nearly \$39,000.

Advisory Committees.

Besides the Trustees, the school has the advantage of various committees who visit the institution and co-operate in its management. These Committees represent the Master Plumbers' Association, Master Painters' and Decorators' Association, Master Steam and Hot Water Fitters' Association, Master Pattern Makers' League, General Association of Mechanics and Tradesmen of New York.

Accommodations.

The accommodations are very fine. There are eight one-story buildings, one two-story, and two three-story, and the rooms

have been arranged with a view to securing large floor area and ample light and ventilation. A library, containing the best class ^{Equipment.} of literature and of technical works, has been provided. Trade and technical papers are also kept on file. The equipment of the various work-shops is excellent. The approximate cost of the accommodations is \$300, and, of the equipment, \$50,000.

At a short distance from the school there is a students' dormi- ^{Students'} ^{Dormitory.} tory, where young men who come from distant points (and they come from all over the American continent, including Canada, and even from Europe and Asia) may obtain accommodation.

CURRICULUM

Throughout the course it is the duty of the instructors to give attention to the following: 1. That each student acquire a workmanlike manner of using his tools. 2. That tools be used properly and for the purpose for which they are intended. 3. That a student acquires a free and easy manner of doing work. An awkward position or attitude is corrected immediately.

Following are details of the courses which are of value, as they embody the results of over a quarter of a century's experience:

Plastering

1. Name of tools and the use of each.
2. Lathing, proper space between laths, number of nails to a lath, breaking joints.
3. Picking up mortar. Practice with hawk and trowel.
4. How to mix mortar for scratch coat; the proportion of sand, lime and hair to use.
5. Applying the scratch coat. Tools required. Where to begin in plastering a room; thickness of coat, and how much mortar should be forced between laths to form a proper key or clinch. Use of the scratcher.
6. How to mix mortar for brown coat; the proportion of sand, lime, and hair to use.
7. Applying the brown coat. Tools required. Screeds and their object. Proper thickness of brown coat and where to begin in the room. Where "dots" are needed and how to make them. How to plumb "dots" with a plumb rule. How to finish if no hard finish coat is to be applied. How to sand finish if wall is to be frescoed. How to brown coat a brick wall.

Bricklaying

The manual work includes the following:—

1. Spreading mortar. The pupil to be shown how to hold trowel; how to cut and take up mortar with the trowel; the movement of the wrist in spreading mortar.
2. Building straight walls, 8, 12, 16 and 20-inch thickness; toothing; gable end and party wall blocking on ends; corbelling.

3. Building return corners, 8, 12, 16, 20-inch thickness.
4. Building intersecting walls, 8, 12, 16, 20-inch thickness.
5. Building piers, 12, 16, 20-inches.
6. Building arches, 8, 12, 16-inch thickness.
7. Building fireplaces and flues.
8. Building walls containing window frames; setting sills and lintels.
9. Laying out and building a house.

Before an exercise is begun the instructor explains the nature of the work and also does the work in the presence of the class.

In his supervision of the students the instructor constantly gives attention to the following: To the position of standing, to the manner of holding and using the trowel, of taking up and spreading the mortar, selecting the best side of brick, how to hold it in, laying to a line, bedding brick properly and cutting off the mortar, putting on the cross joint, to avoid dropping mortar, to striking joints and pointing.

It is the duty of the instructor to have the pupils acquire a workmanlike manner of using the trowel before any pointing or striking of joints is done.

In building arches attention is given to setting the centre, to having the joints of the arch of a proper and uniform thickness, to bedding solidly in mortar each brick in the arch.

Lectures on the following subjects are delivered during the course: Properties of mortar and cement, and how they should be mixed; arches, their various styles, and the advantages of each; flues, their construction and utility; bonding, walls, foundations, materials; how hard finish should be mixed, what materials enter its preparation and the proper proportion of each to use; applying the hard finish; tools required; where to begin a room and number of coats to apply; how to brush and trowel the surface; how to finish angles; what materials are required for cornicing and the preparation of same. Cornices: Tools required; when cornices should be run; how to apply the plaster and use the mold, mitres, circles, rule joints, ovals and arches.

Carpentry

Part I.—Planing. Planing and squaring to a given width and thickness. Planing to a given bevel. Planing to a square piece of four equal sides. Making and proving a straight edge. Slip tongue. Rabbeting. Dadoing. Matching and blindnailing. Beads—plain, return centre, stop. Rabbeted frame. Plumb rule. Boring (three pieces). Mitreing. Casing rabbeted frame. Stop chamfers (five patterns). Square box post-chamfered. Rule joint. Centres—semi-circle, segmental, Gothic, elliptic. Window frame for a frame house. Window frame for a brick house. Pentagons, hexagons, octagons. Joinery—halved-together joint, half dovetail joint, open mortise and tenon joint, blind mortise and tenon joint, mortise and tenon joint, mitre joint, mitre joint with open mortise and tenon, an open double mortise and tenon joint, blind mortise and tenon joint, suitable for the end of a brace, dowel joint, dovetail joint. Corner post. Jamb and door work. Sash work. Large doors. Closet seat. Nest of drawers. Stairs.

Part II.—During the progress of the course the following work will also be done:—

Herring-bone bridging. Deafening of floors. Setting stud partitions. Flooring. Furring. Skirting. Miscellaneous work.

Part III.—Building of a frame house, complete in all details.

At stated periods lectures will be delivered relative to tools, materials, and the work included in the course.

Sheet Metal Cornice Work

Part I.—Cutting curves and circles; showing use of shears. Filing and tinning the soldering copper. Soldering flat seams. Soldering upright seams. Drawing of geometrical problems.

Part II.—Drawing of details, obtaining pattern from same, and setting together the following work:—

Plain capital: Moulded gutter with flat and return head. Square moulded leader head. Octagon moulded leader head. Plain window cap. Ornamental window cap. Raised panel work. Plain cornice with modillions. Ornamental cornice, including brackets. Square turret. Ornamental finial. Sheet-metal cross. Pediment on a wash. Dormer window. Ventilator on a pitched roof. Flat skylights. Hipped skylights. Bay window. Special problems.

Part III.—Hammer work: This section comprises the drawing of details, obtaining patterns from same, and constructing the following:

Hand work: Making a 10-inch full ball in eight horizontal sections. Round finial. Centre piece for a ceiling.

Machine work: Circular panel in two pieces using machine profiles. Circular moulding in two pieces, using machine profiles. Segmental pediments with columns.

The scientific instruction treats of the following: (a) Tools required by the cornice maker and the special use of each; (b) materials; (c) definitions of architectural terms; (d) definitions of geometrical terms; (e) roofing and flashings; (f) slate roofing and flashings; (g) proper way of doing work.

House Painting

Part I.—Name of tools comprising a painter's kit and the use to which each is applied. How to bind a brush. Importance of keeping paint as much as possible off the hands; danger of eating with dirty hands or allowing paint to remain upon them; how to clean the hands. Care of brushes; manner of keeping pots clean.

Part II.—Making putty. Glazing: (1) Removing lights, (2) re-glazing, (3) bedding the glass, (4) cleaning.

Part III.—Painting new wood: (1) Killing knots and green spots; injurious use of shellac on new wood; (2) priming or first coat; (3) puttying and sand papering; (4) second coat; (5) third coat. Burning off paint: (1) How to handle torch and regulate flame; (2) filling in the wood; (3) sand papering. Ordinary painting: (1) Painting brick work; (2) painting wood work; (3) wall painting—preparation of walls. Lining on brick wall with trench.

In doing the work provided for in this section of the course, it is the duty of the instructor to give particular attention to the following: (1) That each pupil uses the different brushes properly; (2) that a free movement of the wrist in using the brush is acquired; (3) that the proper manner of taking paint from the pot with the brush is observed and the importance of cleanliness in work is impressed on the pupil's attention; (4) how to avoid spattering the paint and the need of using up the colour in the pots; (5) way to remove paint that has been spattered.

Part IV.—Mixing white paint—materials required. Names of the ordinary colours and stainers and their use. Mixing oil colours. Mixing kalsomine colours. Contrast and harmony of colours.

Part V.—Painting in three shades. Flatting. Stippling.

Part VI.—Kalsomining: (1) Preparation of size; (2) sizing; (3) preparation of kalsomine; (4) application of same; (5) lining with pencil.

Part VII.—Staining. Varnishing. Treatment of hardwood—cleaning, etc. Polish white and gilding. Graining.

Part VIII.—Exterior painting: (1) Painting brick; (2) painting wood work; (3) painting of tin.

Part IX.—Ceiling work: (1) Cutting out cracks and replastering same; (2) laying in panels; (3) preparing stencils; (4) applying ornaments.

Part X.—Marbling. Bronzing. Paper hanging: (1) Making paste; (2) preparing and sizing walls; (3) hanging paper.

Part XI.—Review of course of instruction.

Parts VIII., IX. and X are for day class only.

The scientific instruction includes the following subjects: (1) White lead, (2) oils, (3) turpentine, (4) dryers, (5) colours and their composition, (6) brushes and their care, (7) painting, (8) gilding, (9) varnishing, (10) kalsomining.

Fresco Painting

Part I.—Name of brushes and the use to which each is applied. Importance of cleaning brushes thoroughly when work is finished. Washing off plastered walls and ceilings. Preparation of walls and ceilings for water colours. Cutting out and filling in cracks. Shellacing cracks and stains. Preparation of size. How to mix kalsomine. Kalsomining and mixing colours. How to hold and use a straight edge. Keeping straight edge clean. How to hold and use a fitch for lining. Wide lines. Running light lines with pencil fitch. Lines crossed at right angles. How to make and cut stencils. Stencilling. Pounces and how made. Painting flat ornaments in one and more colours and edging. Painting mouldings.

Part II.—Painting ornaments in various styles. Stucco painting. Gilding.

Part III.—Advanced ornamental painting. Glazing. Painting of flowers.

Part IV.—Freehand drawing. Elementary and in light and shade. Work to be done from plates and casts.

Sign Painting

The manual work includes the following:

Method of preparing a new sign board for lettering. Treatment of old sign boards for the purpose of re-lettering. Forming letters of the alphabet in Roman, Block and Egyptian styles. How to hold and use the lettering pencil. How to hold and use the palette. How to hold and use the mahl stick. Painting signs in one colour from copy. Painting signs in two or more colours from copy. Shading. Blocking. Lining. Smalting. Gilding on wood. Gilding on glass. Lettering on japanned plates. Lettering on muslin. Lettering on wire.

The scientific instruction consists of lectures on the following subjects:—

How sign boards should be made. Colours principally used by sign painters. How colours should be mixed to meet the requirements of the different kinds of work. Colours to be used in shading and blocking. Styles, proportions, and spacing of letters. Laying out work. Preparation of size. Application of size and leaf. Difference in treatment of gilding on wood and on glass. Japans and dryers. Smalting.

Plumbing

The manual work includes the following:

Seams; overcast joint; cup joint; calking; $\frac{5}{8}$ inch round joint, horizontal; $\frac{5}{8}$ inch branch joint, horizontal; $\frac{5}{8}$ inch round joint, upright; quarter bend; $\frac{5}{8}$ inch branch joint, upright; stop cock; floor flange;

2 inch ferrule; bath plug; $\frac{5}{8}$ inch branch joint, vertical; wall flange; half S trap; S trap; soldering nipple, small; soldering nipple, large; 4 inch ferrule, upright; 4 inch ferrule horizontal; tank seam, upright; tank seam, horizontal; $\frac{1}{2}$ inch round joint, horizontal $\frac{1}{2}$ inch branch joint, horizontal; $\frac{1}{2}$ inch round joint, upright; $\frac{1}{2}$ inch branch joint, vertical; $\frac{5}{8}$ inch round joint, oblique; $\frac{5}{8}$ inch round joint, overhead; plain bib, vertical branch; 2 inch round joint, horizontal; 2 inch round joint upright; 2 inch branch joint, upright; 2 inch branch joint vertical; 2 inch short bend, with ferrule; 4 inch short bend, with ferrule.

On completion of above course, advanced work will be undertaken, namely: Setting up sinks, basins, boilers, wash trays, closets, and bath tubs, making bottle traps and other miscellaneous work.

In the wiping of joints, instructors give particular attention to the following, viz.: 1. That the student holds the ladle and pours the metal therefrom correctly. 2. That the wiping cloth is used properly. 3. Obtaining the right heat for wiping the joint. Forming the joint. Wiping the joint clean. That the wiping is done with one hand only.

Lectures will be given on the following subjects: Drain, soil and waste pipes. Trapping and ventilation of drain, soil and waste pipes. Supply pipes. Boilers. Tanks. Fixtures. Trapping of fixtures. Pumps. Disposal of sewage in country houses. Water supply for country houses. Miscellaneous. Correcting diagrams of improper plumbing.

Steam and Hot Water Fitting

Part I.—Name of tools and the use of each. The object of using oil on cutters and dies; kind of oil to use. How to stand at work-bench; the proper way of using the pipe-cutter. Cut 6 pieces of each size pipe— $\frac{3}{4}$, 1, $1\frac{1}{4}$ and $1\frac{1}{2}$ inch. Each piece to be six inches in length. How to adjust the stock and dies; proper way of using; how to start a thread. Take the piece of pipe previously cut, and make nipples by threading both ends. Number of threads nipples should have. How to cut a crooked thread, and under what conditions used. Building coils; return, mitre and corner coils.

Part II.—On completion of Part I., students receive instruction in the erection and the principles of operation of the various systems of heating, namely:

(1) Steam one pipe; (2) steam two pipe; (3) combination steam one and two pipe; (4) hot water; (5) direct-indirect; (6) indirect; (7) high pressure; (8) high and low pressure.

The work is done from plans and in the construction of the various systems, the piping, fixtures and appliances are put together in the same manner as required in actual practice.

Part III.—During the progress of Part II., the construction, purpose and operation of the following apparatus is explained and illustrated:

Globe, angle, check, safety, and other valves. Radiators. Water feeder. Glass water gauge. Steam gauge. Steam cock. Expansion tank. Feed water injector. Steam pump. Steam trap. Return steam trap. Feed water heater. Pump governor. Blow-off tank. Separator or extractor. Pressure regulator.

During the course a series of lectures on the science of the trade is delivered. The lectures embrace the following subjects:—

Tools, fitting and pipe. General questions on heating. Low pressure steam. Two pipe steam heating. Single pipe low pressure steam heating. Indirect steam heating. Hot water heating. Single pipe main system. High pressure steam heating. High and low pressure steam heating. Exhaust steam heating. Power fan or blower system of steam heating and ventilating.

Blacksmith's Work

Part I.—Use of Tools—Making fire and its management. Names of the different tools used in hand forging. Position in regard to fire and anvil. Explanation of the different degrees of heat. Motion of wrist in handling work and method of striking. Use of the vise and the name and use of the tools required for bench work. Use of the drill press. Use of screw-cutting tools.

Part II.—Forging—This section will embrace pointing, bending, welding, up-setting, splitting, punching and riveting, points, hooks, staples, S hooks, gate hooks, hold fasts, bridles, experiments in welding, rings, chain and hook, bolts, jaws, tees, nose keys.

Upon completion of the above exercises pupils will be given house work, railing work and machine work of a practical character, to execute. The work will be done from drawings and patterns.

Part III.—Tool Making—The instruction will include: Machine and lathe tools; blacksmiths', millers', stone-cutters', carpenters', plumbers', pipe and steam fitters', tin and coppersmiths' tools. Particular attention will be given to manner of tempering.

Part IV.—Vice Work—Filing to line, bevels, clipping, fitting tongues and grooves, scraping, drilling.

The work provided for under this section is performed throughout the course as occasion demands it. When a piece of work has been made, any filing or other vise work that may be required to finish it is done before the work is finally put away.

Theoretical instruction is given on iron and iron working, fuel, iron forging and welding, steel and steel working.

Printing

Part I.—How to stand at the case, and how to set and hold the composing stick.

Learning the case; spacing and justification.

Composition on reprint copy; straight matter.

Composition on manuscript copy; straight matter.

Explanation of point system. The different sizes of type, rules and leads.

Displayed advertisements; reprint copy.

Displayed advertisements; manuscript copy.

Part II.—Job Printing—This includes bill heads, note heads, statements, letter heads, business cards, tickets, dodgers, circulars, blank forms and general mercantile work, cutting and mitering rules. Reprint copy is given at first, and the student is required to duplicate the display type and spacing, after which, he sets from manuscript copy and exercises his own judgment in display and arrangement.

Part III.—Tabular work, without brass rules: One column of words and one column of figures; one column of words and two columns of figures; one column of words and three columns of figures; one column of words and four columns of figures; two columns of words and one column of figures; three columns of figures.

Tabular work, with brass rules: One column of words and two of figures; one column of words and three columns of figures; one column of words and four columns or more of figures with single, double and triple heads; two columns of words and two columns of figures.

Part IV.—After the first week of the course, the distribution of type commences, and the instructors see that students properly sort spaces, and put

accents, italics, head-letters, leads, slugs and rules in their proper places. Cases, galleys, stones and the floor must at all times be kept free from "pi."

Each student is also taught making up, justifying, locking up forms, making ready for, running and cleaning press.

First proofs of each student's work must be kept on file, with his name and the date marked on the head.

HEBREW TECHNICAL INSTITUTE, NEW YORK CITY

GENERAL

The aim of the Hebrew Technical Institute is to provide for Aim. the technical education of Jews and others of limited means in studies that will fit them for mechanical trades. It has been in existence since 1883, and is supported by contributions of members of the Hebrew Technical Institute Society and by the revenue from Maintenance. investments amounting to \$200,000. The school occupies a six-Accommoda- storey building, with good class rooms and equipment. There are tions and two buildings, which cost about \$38,000 each. The equipment cost Equipment. \$36,300; salaries, \$26,500; material, \$41,000; and other items, \$11,000.

Candidates for admission must be residents of New York, at Admission least twelve and a half years old, healthy and strong, with satis-tests. factory testimonials of character. On the average, about 40 per cent. of the entrants are below fourteen, and about the same percentage have not graduated from the Grammar Schools. They must also pass an entrance examination in arithmetic, English, geography, and United States history. Last session the day school attendance was 270; the evening, 68.

Practical evening classes are maintained in tool making, instru-Evening ment making, die making, machine work, pattern making, cabinet Classes. making and mechanical drawing. To these classes are admitted machinists and men in cabinet and pattern making shops who are over nineteen years of age. The classes are held three evenings a week, from 7.30 to 9.30. The instruction is free, but \$1 a month is charged for material. The course extends over two years.

The daily session is from 9 a.m. till 5 p.m., except on Friday, Day School. when the school closes at 4, and Saturday, of course, is a holiday. The junior class is dismissed at 4.

Tuition, books, and tools are free, and hot lunches are provided at a cost of ten cents a week. The cost of each pupil was \$119.

The school contains an excellent reference library, chiefly on Reference mechanical and scientific subjects. It has also a circulating Library. library, containing books of travel, history, biography, literature, poetry, fiction, etc.

Savings Fund.

A students' savings fund has been established, the object being to enable graduates to purchase out of their savings the tools and instruments they need on leaving the school.

My impression of this school is that it is a very excellent one indeed, and that schools patterned upon it would be useful in some parts of this Province.

Character of Courses:

While the school provides for technical training, a large part of the daily work is given to the essentials of a good education; and, as the classes are kept small, pupils usually advance at least as rapidly as in the Public Schools.

General Industrial.

The course is a three years' one and is so arranged that during the junior and middle years the students are instructed in the subjects that will be useful to them whatever mechanical pursuit they may finally choose. In the third (the senior) year they are encouraged to give special attention to the branch of the work that seems most agreeable and suitable for each. The school does not aim at teaching the higher branches of mechanical, civil, or electrical engineering. The great majority of the graduates are intended for positions as skilled artisans; for example, foremen in wood and iron working shops, electrical industries, and draughtsmen in architects' offices and manufacturing works, as well as workmen in the various industries. The list of graduates and their vocations at the end of the catalogue for 1910 shows that the majority take up a trade and often advance to responsible positions.

Trade and Technical.

The following are the courses of study:—

CURRICULUM**JUNIOR YEAR.**

English: Reading; spelling, definitions, penmanship (vertical system); language lessons; exercises in composition and letter writing; rhetoric; literature; American history; geography; map drawing.

Mathematics: Arithmetic—Common and decimal fractions; denominate numbers; square root; cube root; metric system; percentage; proportion.

Algebra.

Geometry: Study of form; mensuration; inventional geometry; plane geometry.

Short home lessons are assigned daily.

Applied Science: The mechanical powers, matter, gravitation, hydrostatics, heat, sound, and light; elementary laboratory work; simple experiments in electricity. Experimental chemistry.

Mechanical Drawing: Instruction in the elements of drawing; handling of instruments; exercises in the use of T-square and triangles; working drawings of simple objects and bench exercises; lettering.

Free-hand and Decorative Drawing: A series of elementary rectilinear exercises based upon the square; these exercises formed into borders; other borders made with straight lines (Meanders); the circle; exercises with the complete circle and with arcs; regular triangle and polygons; simple rosettes; the ellipse; oval and related forms; conventionalized leaves and flowers. These

exercises are made at first with pencil only, then the outlines are traced in ink and water colours applied.

Object Drawing: Beginning with the cube, many objects, principally with straight edges, are drawn, such as boxes, books and furniture, shading alternatively with pencil and brush, aiming at exactness of outline and correctness of shading.

Regular home work is necessary.

Wood Work: Uses of the bench and the chief wood-working tools; principal characteristics of woods; exercises with plane, chisel, saw, and other tools; joints and articles illustrating their use; glueing, finishing with stain, shellac, and wax.

MIDDLE YEAR.

English: Grammar; composition; letter writing; business forms; penmanship (vertical system); rhetoric; literature.

History of the United States completed. Biographies of eminent men of America, and its political and scientific developments. Jewish history.

Geography, completed; map drawing.

Industrial topics; study of woods.

Lectures upon general science, mechanics and shop work.

Mathematics: Algebra. Plane and solid mensuration. Plane and solid geometry; applied geometry.

Applied Science: Physics; mechanics; heat; light; sound; laboratory work. Electricity; laboratory work in static electricity and magnetism.

Geometrical Drawing: Patterns for sheet-metal work; projections and drawings as applied to machine-shop exercises; lettering and blue-printing.

Free-hand Drawing: Decorative Drawing.—Artistic lettering, outlines of vases; the plant ornament applied to floor designs, borders, panels, and wall papers; each copy is succeeded by a free imitation or composition; general use of water colours.

Object Drawing: Beginning with the cylinder and sphere, a series of objects with curved surfaces are represented such as fruits, cups, dishes and vases; sketching of animals; shading alternately with pencil or brush; the aim being an artistic rendering of surfaces.

Regular home work is necessary.

Wood Work: Exercises in joinery and constructive carpentry.

Lathe Work: Centre work; face plate work; geometric solids.

Construction work: Joinery; model of a window sash or panel door; printing frame; dovetailed box; staining and polishing.

Wood Carving: Use of carving tools; sharpening tools; geometric designs in chip carving; designs in Renaissance; conventional designs cut in high and low relief; classic architectural styles and ornamentations; constructive furniture and cabinet work.

Metal Work: Instruction in the quality and manufacture of brass and iron; use of the different chisels, files, and small tools; chipping and filing; speed lathe work; use of drill press, planer, and shaper.

SENIOR YEAR

The student pursues all the studies of the fundamental course, and, in addition, those of one of the special courses.

Fundamental Course

English: Grammar; American and English literature; rhetoric; composition correlated with concrete and technical shopwork; narration; description; argumentation; exposition.

Physical geography.

Civics.

Industries and natural resources of the United States.

Talk on woods, metals, coals, building materials, and kindred subjects.

Lectures upon general science, mechanics and shop work, illustrated by stereopticon views; upon the preservation of health; upon the duties of citizenship.

Mathematics: Physical arithmetic as applied in the laboratory.

Arithmetic: General review and final examination.

Algebra: Quadratics, ratio, proportion, progression, evolution of formulas, and logarithmic computation.

Plane and solid geometry as applied in the shops. Plane Trigonometry. Elements of mechanics.

Applied Science: Physics.—Experimental mechanics; advanced laboratory work; construction of apparatus.

Electricity: Electricity and magnetism as applied to the telegraph, telephone, lighting, transmission and distribution of power.

Primary and storage batteries; electric heating and welding.

Chemistry: Lectures and elementary experiments; laboratory work.

Engineering: Text book work and lectures.—Study of the theory and principles of reciprocating and rotary steam engines, internal combustion engines, boilers, pipes, valves, pumps, injectors.

Practical operation of the injector; operation of the steam engine, gas and gasoline engines; fuel, boiler and brake tests.

Applied Mechanics: Elementary principles of graphical statics illustrated by many problems; theory of stresses as applied to calculations in building and machine design.

Mechanical Drawing: Cabinet projection; working drawings for pattern making; working drawings for machine-shop exercises; architectural and machine drawings.

Free-hand Drawing: Decorative Drawing.—Flat ornaments in the historic styles; monograms; more elaborate use of water colours; architectural drawing with pen and ink; interior wall decoration.

Object Drawing: Flower drawing with pencil; pencil sketching of buildings and their parts; groups of objects; still life; pen and ink sketches.

Wood Work: Advanced lathe work; pattern work; moulding and casting in white metal; cabinet work; veneering and polishing; construction work in carpentry.

Architectural wood work, grill work, interior finish.

Wood Carving: Carving from casts and working drawings; draught carving for moulding; constructive furniture; applications of ornamentation; lectures on architectural styles.

Metal Work: Advanced work on speed lathe; plain and taper turning; cutting threads on engine lathe; planing; drill press exercises; gear cutting; making tools, taps, reamers, and milling-machine cutters; grinding; forging, annealing, hardening and tempering.

Forging: Practical work in forging squares, rounds, and welding.

Forging, hardening, tempering and grinding lathe tools.

Some ornamental iron work is done to develop facility in handling tools and metal, but the principal work is in producing practical tools for actual use.

Inspection Trips: Inspection trips to the country, parks, museums, shops and industrial establishments, under the guidance of a competent instructor and regularly conducted, form an important part of the courses during each of the three years.

Special Courses

Each course is for two hours a day.

1. Mechanical Drawing:

Parallel and angular perspective.

Architectural Drawing: Foundations, piers and walls; floors, roofs, and stairways; structural iron work; plans of buildings; round writing; artistic lettering; tinting.

Machine Drawing: Isometric and cabinet projection; cams and wheel gearing; boiler settings; details of steam engine and dynamo; details of special machines; assembled drawings; lettering.

2. Wood Working:

Advanced pattern making at the bench and lathe; moulding and casting in white metal; carpentry work; cabinet work; polishing; wood carving; advanced wood turning.

Architectural wood work, grill work, interior finish.

3. Metal Working:

Theory and practice in the use of metal construction, and the making of tools, cutters, gear wheels, etc. Making, hardening, tempering, and grinding cutters, drills, and tools. Construction of some machine or apparatus, as speed lathe, dynamo, emery grinder, small milling machine, or electrical instrument; fitting thread and taper work; forging.

All work is made to size. Blue prints and micrometers are constantly used.

4. Instrument Making:

Theory and practice in the design and construction of electrical and scientific instruments and apparatus.

Machining and finishing brass, copper, hard rubber, and steel; gear cutting, fitting threads, boring, taper turning, grinding, polishing, plating, making special tools.

Constant use of the micrometer and similar accurate measuring instruments is required.

5. Practical Electricity:

Lectures and recitations, 2 hours per week, additional.

Experimental work: Electro-magnetism; primary and storage batteries; dynamos and motors; electrical measuring with amperemeter, voltmeter, and wheatstone bridge; electrical testing of dynamos, motors, and arc lamps; construction of apparatus for use in demonstrations and experiments; application of alternating currents of electricity.

6. Wood Carving:

Analysis of antique and modern ornament relating to decorative principles in the composition of ornamental panels, pilasters, capitals, mouldings, and other features as applied to furniture in various periods or in interior architectural decoration.

Making of moulds and reproducing carved models in plaster.

7. Free-hand Drawing:

Decorative Drawing: Flat ornaments in the historic styles; monograms, title pages, book covers; interior wall decoration; more elaborate use of water colours; architectural drawing with pen and ink; systematic instruction in ornamental composition.

Object Drawing: Flower drawing with pencil; pencil sketches of buildings and their parts; groups of objects; still life; sketching of animals. The sketching is done with pencil, pen or brush.

BARON DE HIRSCH TRADE SCHOOL, NEW YORK CITY

GENERAL

This institution was established by the Baron de Hirsch fund in 1891. Like the New York Trade School, it is a short-course trade school. Its object is to give young Jews, who alone are admitted, a practical knowledge of a trade and enough theory to prepare them for the grade of journeymen. Entrants must be at least sixteen years of age, and be able to speak, read, and write the English language. They must also be able to maintain themselves during the session. The course lasts five and a half months, and in this time a student is expected to acquire as much as he would in a shop in two years. Day instruction only is provided; there are no evening classes. The management believes that evening classes are not an efficient means of training beginners. Its argument is well worth the production:

Aim. Twenty-two weeks of day class instruction are required to prepare pupils to enter the trades as helpers. To give the equivalent, one hundred and seven of evening class instruction, or, approximately, three school years, are necessary when a percentage of those completing the course would be much smaller. As a result, pupils would enter the trade before they were prepared. The evening schools' statistics of other schools demonstrate the truth of this statement. Moreover, the evening school makes it easy for large numbers to attempt to learn a trade at very little sacrifice, the result being that many enter without definite aims. On the other hand, the short-course day classes compel a sacrifice of a certain wage-earning period, and, as a result, the pupils have a greater appreciation of the advantages. An average of 84 per cent. of those enrolled in this school remain throughout the course and graduate.

Only Day Classes. The building, including permanent plant, is worth \$158,000, and the equipment \$10,000; total yearly cost of maintenance, \$37,940, each pupil costing \$157.92, not including cost of books.

Argument against Evening Classes.

ORGANIZATION

Cost. The trades taught. The trades taken up are machinists' work, plumbing, house-painting, electrical work, carpentry, fresco painting.

School Courses. The shop work is in charge of instructors, who are expert mechanics of long experience. The course gives a maximum amount of actual practice. The theoretical side of the trade is explained in frequent lectures and shop talks. Notes are taken by the pupils, to be afterwards carefully copied at home into note-books specially provided. They are at the same time given suitable

Note-taking.

printed diagrams and tables for the purpose of illustration, and these are bound up with their shop notes. This note-taking is an important feature of the course. The theoretical side of the instruction is more developed here than in the New York Trade School. The academic work consists of mechanical and geometrical drawing and shop arithmetic and mensuration. During the latter part of the course in drawing a set of plans and elevations for a cottage are prepared by the carpentry, electrical, and plumbing divisions. During the term examinations are held, and those who fail are dismissed from the school. On the completion of the course each graduate is given a certificate, and a kit of tools. The latter is provided by the fund, but each graduate is expected to repay the cost. Certificates.

As to the effect upon the wage-earning power of those who have taken this course: On investigation it has been shown that the average wages of some two hundred pupils before entrance was \$5.39 per week, earned at various unskilled trades; and that, after a five and a half months' course at the school, they earned, on graduation, an average of \$7.54 a week. And, further, there has been such a demand for skilled helpers that they have had little difficulty in obtaining from \$5.00 to \$15.00 a week, and in about two years' time they are able to earn journeymen's wages. Increased wages.

MANHATTAN TRADE SCHOOL FOR GIRLS, NEW YORK CITY

GENERAL

This vigorous short-course trade school was established in 1902 to train girls for trades in which they might obtain a living wage and advance to more responsible positions. The present building provides accommodation for 500 girls. At first independent and supported by private benefactions, the school has just been taken over by the New York Board of Education. For admission, applicants for the day classes must not be under fourteen or over seventeen, and they must have completed the Fifth grade of the Grammar School or its equivalent, unless special arrangement is made with the Principal of the school last attended. Admission tests.

The School is free, and where the Students are poor, a scheme of assistance has been devised, the need of the girl's family being the basis on which the assistance is given. School free.

A lunch-room has been established, and the students assist in succession in preparing, serving and clearing away. In times of depression a work-room was opened for the unemployed and the school served meals daily to more than 500 people. With the inauguration of regular cooking, in this way a scheme was adopted for training at least some of the girls in the care and preparation of food. The selection is made from three groups of girls: Meals.
Training in Cookery.

1. Those who can remain long enough to complete their trade and take the cooking course;
2. Those who have such poor health that a knowledge of what to eat and how to cook it is a first consideration; and
3. Those who are already, for various reasons, house-keepers in their homes.

Twenty girls are chosen at one time who work in groups of ten for six weeks daily. In this way thirty lessons are given which are almost equivalent to a year's provision in the Public Schools.

CURRICULUM

Courses.

The departments of the school are based on the use of the needle, the sewing machine, and the paste brush. These trade branches are supplemented by art and academic studies and physical training. The courses, which average a year each, are as follows:

1. *Electrical Power Operating*: (a) General operating, (b) special machines: Lace stitching, hem stitching, button-hole embroidery.
2. *Dress Operating*: Lingerie, fancy waists and suits.
3. *Straw Sewing*: Women's and men's hats.
4. *Dressmaking*: The usual course, including wholesale and custom work.
5. *Millinery*: Elementary work for assistants, frame workers, and preparers.

6. *Novelty Work*: Sample mounting, sample book covers, tissue paper novelties and decorations, jewellery and silver-case making, etc.

NOTE.—The trades under this head are continually developing according to the demands of the public.

7. *Art*: Both general and advanced courses adapted to the work of the trades; colour setting, costume sketching, stencilling and perforation.

NOTE.—This department, originally intended to be auxiliary to the trades, has developed also into a separate department.

8. *Academic*: Business arithmetic and English, industries and textiles, civics, ethics of drawing, cost of living.

9. *Physical Training*: Examination and treatment exercises; hygiene.

Organization Elastic.

The elasticity of the organization deserves special notice: The length of time the pupil remains varies according to the course selected. In millinery, it is from six to eight months; in elementary art trades, from twelve to fifteen; in sample mounting, about six; in novelty work, from six to twelve; in machine operating, from twelve to fifteen; in dressmaking, from twelve to eighteen, although the greater number remain only twelve. Moreover, the work is so arranged in each trade department that about every three months there is some degree of finality; so that a pupil who must go out to work may be prepared in that period for some kind of wage-earning. In the ordinary meaning of the term, there is no graduation. Pupils leave when there is an opening and they

have reached a point satisfactory to their instructors. Certificates are afterwards granted to such pupils; first, if they have good school records in trade work, academic work, and art work, and if their spirit while at school has been satisfactory; secondly, if a satisfactory report is received from the employers, of their ability to meet the requirements of the trade in which they are engaged on leaving school.

Order work is regarded as a valuable educational feature of the teaching, but it is kept under strict control and used only when it is really useful for training students. In the dressmaking department, individual custom work is preferred because large orders from the trade must be delivered in a short time and their educational value is lost in many repetitions. In the operating, millinery, and art departments, the training of assistants for millinery work-rooms can be accomplished without an undue amount of order work; and in art, the order work is often so elaborate that too much of the time of the instructors would be required to prepare it for the girls. In the novelty department small orders rather than large ones are desired.

The following statement of the trade order work for eighteen months (January, 1908, to July, 1909), shows the situation:

| Department. | Amount of sales. | Department. | Amount of sales |
|-------------------|---------------------|---------------------------|--------------------|
| Dressmaking | \$19,196.22 | Millinery | \$73.74 |
| Operating | 2,363.34 | Dressmaking operating ... | 506.61 |
| Novelty | 1,820.74 | Art | 68.84 |

THE HEBREW TECHNICAL SCHOOL FOR GIRLS

GENERAL

Of the trade schools for girls that I saw during my visit, this is one of the finest in the matter both of accommodations and equipment and of culture and general tone. It is on a private foundation, and is not connected with the public system. Its attendance is about 400, and consists chiefly of the children of Jewish immigrants. The school is free, and further aid is given when it is needed. One of the noticeable features is the swimming pool, which cost \$23,000, and is now amongst the best and most enjoyable of the school utilities. The cost of its maintenance, including the salary of the teacher, is less than 8 cents a week for each student. Besides the pool, the school has a commodious gymnasium and a roof garden. The system of ventilation is also excellent, 750 cubic feet of fresh air being introduced every minute in every class-room.

The school hours are from 8.30 a.m. to 4 p.m. The only summer vacation is one that the pupils have at their work in the build-

ing. During July and August, however, less mental work is prescribed than during the rest of the year. Then, also, attention is given to the cultivation of the speaking voice, additional time to choral work, and the improvement of the physical condition.

Aim.

The plan of the school is to build a sound educational superstructure on a good physical foundation. While it provides vocational training, it emphasizes the cultural and the home-making subjects. From what I saw even during my brief visit it was evident that the scheme is a successful one.

Course of study.

The course of study lasts for eighteen months, and includes the following subjects:

1. *Commercial Department*: Stenography, typewriting, book-keeping, arithmetic, penmanship, geography, psychology, literature, history, rhetoric, cooking, housekeeping, physical training, music, social ethics.

2. *Manual Department*: Sewing, millinery, history of industries, cooking, drawing, millinery, psychology, geography, arithmetic, literature, history, rhetoric, physical training, music, and ethics.

BOSTON TRADE SCHOOL FOR GIRLS

GENERAL

Aim.

This trade school was founded in 1904 and provides girls between the ages of fourteen and eighteen, as soon as they leave the Grammar School, with training which will enable them to enter the skilled trades of dress-making, millinery, clothing machine operating, and straw hat making. It is intended also to increase their general efficiency and relate this efficiency to their home life, and to improve their condition mentally, morally, and physically. For several years a private school, it was taken over in 1909 by the Boston School Committee. At present it is accommodated in three houses which were originally built for private occupancy. The equipment, however, is good. Both electrical and foot power machines are provided. The basement serves as a lunch-room and the large parlour in one of the houses is used for daily assemblies, trade work, gymnastics, and recreation. The school day lasts from 8.30 to 5.00 p.m., with an hour's intermission at noon, and the school is in session all the year around. An average of five and a half hours daily is devoted to trade instruction and of about two hours to supplementary academic work. The work made by the pupils is sold, thus giving them the advantage of actual trade practice and enabling the school to more than cover the cost of the material used. Here I may say that the practice of selling the products of the girls' trade school appears to be general. The labour unions do not object to it; chiefly, I am told, because there are so few unions amongst women, and because the volume of the

Equipment and accommodations.

School Sessions.

Disposal of Products.

products is small compared with those that come from ordinary trade sources.

The trades taken up centre about the needle and the foot electrical machines, as these are the trades from which the greatest demands exist for skilled workers: Dress-making, millinery, clothing machine operating, straw machine operating. Each pupil elects one trade, but in each of the departments the girls are prepared to enter a variety of trades. For example, the work in dress-making is so planned that girls may take positions as seamstresses, dress-makers' helpers, experienced skirt finishers, waist finishers, or sleeve finishers. So, too, in the case of millinery, girls are prepared to become frame makers, hat makers, or trimmers; and, in machine operating, also, a great variety of trades are opened to girls. No attempt, however, is made to produce expert trade workers. The object is rather to give the necessary experience, skill, and speed in some of the more fundamental processes by combining the school and the shop.

The courses supplementary to the trade work are obligatory. Design is taken up on account of its bearing upon dress-making and millinery. Domestic science is also provided to give the girls the help they need at their homes and in the hope of developing at some future time trades related to house work.

The length of the course for the average pupil is one year, and certificates are granted pupils who complete a course satisfactorily and prove their ability in the trade elected.

CURRICULUM

The following are outlines of the various courses:

Dressmaking.

1. *Children's Garments:* Giving practice in construction, and in hand and machine sewing, including use of electric power machine.
2. *White Work:* Underwear, giving use of finer material; construction of larger garments; practice in more difficult processes; fine hand tucking, rolled edges, lace inserting, simple embroidery, etc.
3. *Fitted Linings:* Shirt waists; use of various textiles; shirt waist suits and simple dresses.
4. *Costumes:* Giving practice in dress finishing, simple braiding and embroidery.

Millinery.

1. *Plain Sewing:* Giving practice in hand and machine sewing, including special stitches used in millinery; shirring, velvet hemming, wiring, etc.
2. *Hat Making:* Summer materials, including linings, bands, frames, straw braiding; making of maline, chiffon, lingerie, and straw hats.
- Winter materials, including buckram frames, fitted and draped coverings; making of felt, velvet, satin and silk hats.

Clothing-machine Operating.

1. *Clothing Machines*, with practice on straight-away work, aprons, etc.
2. *Plain Sewing*.
3. *Garment Making on Electric Power Machines* (no basting): Aprons, underwear, petticoats, kimonos, waists, children's clothing.
4. *Use of Special Machines*: Buttonhole machine, tucking machine.

Straw-machine Operating.

Straw Machines, including:

- (a) Use of coarse braids, lappings, joinings, tip making, fitting of simple shapes to plaster blocks.
- (b) Use of fine braids, handling of delicate colours, braid combinations, and fitting difficult shapes to blocks.

Supplementary Work.

1. *Spelling*: Terms used in the trade.
2. *Business Forms*: Trade problems, bills, accounts, etc.
3. *Business English*: Applications for positions, ordering materials, letters to customers, descriptions of costumes, hats, etc.
4. *Textiles*: Processes of manufacture; judging kinds and qualities of materials; learning uses, widths, prices, etc.
5. *Colour Study and Design*: Principles applied in copying and planning hats and costumes; judging good and poor design and colour combinations; selecting materials in colour schemes; designing simple costumes and making practical designs for braiding and embroidery.
6. *Cooking*: Planning, preparing and serving the daily luncheon; care of lunch room, kitchen, dishes, closets, towels, etc.
7. *Physical Exercises*: These are given daily, together with lessons on the care of the body and the necessity of proper food, sleep and exercise. The individual needs of each girl are carefully noted, and an effort is made to correct such deficiencies as will be a drawback to a girl in her trade work. Emphasis is laid on correct postures in sitting and on the need of fresh air in the work room.

II. INTERMEDIATE INDUSTRIAL SCHOOLS

NEW YORK CITY VOCATIONAL SCHOOL

ESTABLISHMENT

Scheme of
Schools.

New York City was the first large city to take steps to provide for intermediate industrial training. At a meeting of the Board of Education in July, 1908, a report was adopted, a synopsis of which I now give, as it sets forth the general aim of the Intermediate Industrial Schools:

In order to give training for particular vocations or industries, your committee recommends:

- (1) The establishment of separate vocational schools for the secondary ninth and tenth school years (Lower School of our High Schools);
- (2) The organization of different types of these schools, the course in each to be two years in length, and the pupils to be those who have

graduated from the public elementary schools or who have reached the age of 14; and

(3) A general course, which is to be taken by all the pupils, and a variety of industrial courses, any one of which may be selected by the pupils on entrance.

Such vocational schools are not intended and cannot undertake to graduate journeymen or skilled mechanics. They purpose rather to give the pupil skill in the use of tools and a knowledge of those processes and principles that underlie constructive work, so that he may be able to apply the knowledge thus gained to definite and concrete problems.

It is thus hoped to do away with the situation created by specialization, and the necessity of "stealing a trade." The pupil who has gone through this course should in a short time be enabled to become a self-supporting and properly trained workman or mechanic.

These vocational schools, moreover, are not intended to take the place of the High Schools. They are designed for the purpose of making more efficient wage-earners by giving to boys who cannot or will not attend High Schools a better and more practical training.

As a result of this action, it was decided to open two such industrial schools in New York City: one for boys and one for girls. The one for boys I was able to visit. It is yet in its initial stage, having been opened in the fall of 1909.

GENERAL

The admission standard is the graduation diploma from an elementary school. Pupils who have not graduated may be admitted on certain conditions if they are fourteen years old. Admission tests.

In order to accustom boys to the realities of the business world, the school day begins at 9.00 a.m. and lasts till 5.00 p.m., with one hour for lunch. There are no home lessons and no books are carried to or from the school, but a pupil may arrange with his instructor for special work to be done at home if he so desires. The school is open during July. Boys may enter then or in September. School Sessions.

In this school the pupils have an opportunity of learning the elements of a trade and of studying architecture and freehand and mechanical drawing, while continuing their general education along lines that fit in with this work. Courses.

The course is intended to cover one year or two years, but provision is made for those who wish to remain longer in the school. Those boys who definitely know the trade they want to follow are allowed to take up that work at once and devote most of their time to it. Those who have not decided on any special work are required to take up several lines of trade work. After a time the instructors are able to advise the boys intelligently and the pupil then devotes his time to the trade he selects. The Principal of the school is trying to carry out a plan in which there are no organized classes and the boy progresses as quickly as his ability will permit. The work is intended to be individual, but the boys work in groups. Individual instruction.

In addition to the trade work, the boys are required to take trade drawing, along with the non-vocational subjects, to which they devote about a quarter of their time.

Qualifications
of Staff.

The teachers are experts; the trades are taught by experienced mechanics.

CURRICULUM

The following are the courses of study:

Vocational Subjects.

Woodwork: Cabinet making and bench work, wood turning, pattern making in wood, use of wood-milling machinery.

Metal Work: General machine-shop practice, sheet metal work, forging, plumbing, electric wiring and installation.

Printing: Composition, press-work.

Drawing.

Mechanical: Working drawings, isometric, architectural drawings.

Freehand: Industrial design; making and reading blue-prints.

Non-vocational Subjects.

Trade Mathematics: Arithmetic, use of symbols (elementary algebra).

Plane Geometry and Trigonometry as used in trade.

English: Business letters, reading with oral and written expression, drawing of contracts, writing specifications, etc.

Industrial History: Civics, industrial and commercial geography.

Science: Applied physics and chemistry.

Business Subjects: Elements of commercial law, simple bookkeeping.

ALBANY VOCATIONAL SCHOOL

ESTABLISHMENT

Another variant of the vocational school has been established at Albany. I was unable to visit it, but have obtained full information from Mr. Arthur D. Dean, Chief, Division of Trade Schools, State Education Department, Albany. The character of the proposed school was discussed in October, 1908, at a meeting between Mr. Dean and the Board of Education. The school has been in existence over a year. The mode of establishment and the organization deserve special attention.

Procedure.

The local board addressed a circular to the parents and guardians of the boys and girls in the sixth and seventh grades of the elementary schools, informing them that this vocational school would be opened and referring briefly to the purpose of the school, its equipment, staff, course of study, and requirements for admis-

sion. The Principal and the Domestic Science teacher of the vocational School also visited the grades of the elementary classes, explaining in greater detail the purpose of the School and distributing blanks to be signed by such parents or guardians as wished their children to attend. More than twice as many applied for admission as could be accommodated.

The equipment consists of the following:

1. *Drawing*: 25 drawing tables with drawing materials and instruments. Equipment and accommodations.

2. *Sewing Equipment*: 5 sewing machines, 25 sewing tables, with minor articles of equipment and material. The sewing tables are also used for drawing in connection with household design.

3. *Woodworking*: 24 benches with the necessary bench tools, tool room supplies, universal saw bench, a band saw, power oil stone and grinder and 4 speed lathes. An electric motor was also installed. A lumber and wood finishing room adjoins the bench room.

4. *Domestic Science*: A group of cooking tables, with pine tops, accommodating 24 students; gas stoves, a gas range, coal range, refrigerator, and the furnishings of a dining-room; also a small iron bedstead.

The class rooms for the academic subjects are fitted as in schools for academic purposes.

The teachers of the School are all experts, having had practical experience in shops and in schools. Qualifications of Staff.

The local Advisory Board required by law consists of the Superintendent of the felt mills, the Manager of the stove works, a contractor and builder, a printer (Trade Union representative), and the chef of one of the hotels. Advisory Board.

The last report shows that so far the school has been very successful and that larger accommodation will have to be provided. It is well to note in this connection that the New York Central Railway Company will give credit *pro tanto* in their apprenticeship system to the graduates of this school, and the General Electric Company will give preference to such students receiving training similar to theirs on their application for admission to their apprenticeship system. Attitude of employers.

CURRICULUM FOR BOYS

In book work there is constant practice in measurements, estimates of cost, descriptions of processes used from the point of view of good English as well as of accuracy. The English course provides also for literature, reading, composition, grammar, spelling, and penmanship.

The courses in mathematics and science are as follows:

Arithmetic: The decimal equivalents of workshop fractions, approximate and check methods of arithmetic, ratio, proportion and percentages, four figure logarithms applied to multiplication and division, power roots and the developing of all sorts of pocketbook formulæ.

Algebra: Symbols and processes, substitution of numerical for literal values and the evaluation of simple workshop formulæ, solutions of equations other than simple by plotting "graphs" on squared paper. No "formal" algebra; it will be made to fit in with formulæ used in electricity, mechanics and engine practice.

Mensuration: Measurements of areas of plane figures, (1) by reducing to equivalent triangles; (2) by counting squares when drawn on squared paper; (3) weighing the similar shape in cardboard, sheet lead or iron sheet. Measurement and calculation of volumes.

Geometry: Use of instruments, simple construction as far as possible leading to the self-checking of students' work, (1) by comparison with one another or (2) by a calculated standard result, measurement of angles and their ratios by construction and comparison with printed tables (trigonometrical), the amount of error to be written down opposite the result, the geometry of simple solid figures, etc.

During the last two years, as well as to some extent the first two years, the mathematics will deal with the speed of machines, the working out of such calculations as weights of castings, measuring areas, calculations and exercises in the use of various measuring machines used in the trades, calculating by graphic methods, etc. For example, a boy that intends to be a foundryman needs to know weights of materials, percentages of alloys, etc.

Physics: The general properties of matter—state, structure, size, density, hardness, fluidity, etc.—effects of heat on substances used for constructional purposes, specific, sensible and latent heat, and the practical application of their qualities, melting and boiling points of suitable substances, steam raising and the properties of steam, the transmission of heat—conduction, convection and radiation and application of this to practical work—hot and cold water supply, use of exhaust steam, heating and ventilating methods, circulation of water in steam, boiling, etc., injectors, inspirators, steam boilers, etc.

Chemistry: Effects of heat, moist air, water and simple acids on materials used for construction purposes; rusting, rotting and the action of protective coverings on metal and wood, combustion of solids, liquid and gaseous fuels, and the application to industrial purposes, interchangeability of energy, chemical heat, electrical, mechanical, some notion of the conservation of energy.

Electricity: Batteries, electric magnets, motors, etc., electric wiring and simple testing.

Practical applications of the science subjects to the industries are made. The physics deals with levers, cams, concentric, reciprocating, rotary, oscillating, friction, strains, tension, with relation to their practical application to the machinery in the school and in the locality.

History and Civics: The course has for its general idea the development of the industrial citizen and consequently lays emphasis on the industrial or economic phenomena of the national development rather than upon its political and military aspects. Emphasis is placed upon the development of transportation and communication, the establishment and growth of cities together with their new code of civic life, the changes brought about by the concentration of capital and labour in production, and the civic duties and privileges of the modern industrial citizen.

Geography: The course centres about collections of the raw materials of commerce such as may be gathered and classified by the pupils. Textiles, gums, minerals, oils, woods, leather, rubber, threads, etc., are shown in their native forms and in the various stages of their manufacture.

Hand Work: The course for boys differs from what is ordinarily the conception of manual training, in this respect chiefly, that from three to five half days per week are given the subject, whereas many schools give only about one and a half hours a week to such work. It is intended that in the last two years the hand-work shall centre around direct applications to local industries. Provision is also made for sheet-metal work, tinsmithing, soldering, gas piping, metal spinning, electric wiring, and speed lathe work, both in wood and metals. At this stage, the pupils are about sixteen, and they are expected to elect their trade.

Drawing: In the first year emphasis is laid upon inventive design both in freehand and mechanical drawing. The industrial drawing aims constantly at the graphical expression of original creation rather than imitation. The drawing of the last three years consists of the practical application of mechanical and freehand work to parts of machinery, house plans, etc. Emphasis is placed upon the reading of drawings, making sketches of machine parts quickly and accurately.

CURRICULUM FOR GIRLS

These courses are modelled rather on the workroom than on the school-room plan, and provide for housekeeping, sewing, and design.

Housekeeping: The kitchen and dining-room are furnished in very simple style. In the housekeeping course the girls are taught:—

(1) To care for the rooms; sweep, dust, clean windows and paint, build a fire and care for the stove, sink and tables.

(2) To cook simple nutritious dishes in family quantities and to buy the materials for these dishes.

(3) To serve a simple meal and know something of its nutritive value, expense, and fitness.

(4) To wash and iron the garments made in the sewing classes, the aprons worn for school work and the towels, table mats, and curtains used in the house.

(5) To keep a book of recipes used in the cooking lessons.

Sewing: This work is carried on in a large schoolroom which has been fitted with work tables and sewing machines. The girls are taught to make a variety of simple garments for themselves or members of their families, as well as articles used either in the home or in the school. The course also includes cutting by patterns and the making of simple drafts. The study of fabrics, especially those made from cotton and wool, is a part of the course, and the girls are taught something of their manufacture, quality, patterns, dyes, widths and uses. They are also encouraged to collect and mount samples of different materials which they would be most likely to buy and use.

Design: An attempt is made to apply the simple principles of design and colour to the work in the other classes. The girls have designed and stencilled curtains for the dining and sewing rooms and have made designs for doilies for the table. They expect to plan attractive spacing of tucks, ruffles and embroidery for underwear, and select combinations of colour and trimming for dresses. They will also make designs for articles used in the house, such as candle shades, pillow covers, and the like. These designs will be executed in their other classes.

WORCESTER INDEPENDENT INDUSTRIAL SCHOOL, MASSACHUSETTS

Accommoda- tions.

The Worcester Trade School is an independent industrial school, constituted under the Massachusetts School Act, and has been in operation since September, 1909. The building for the offices and academic work is a plain square one of four stories, with two long, well-lighted shops in the rear. The building and equipment were provided by the City of Worcester, at a cost of about \$90,000. The intention of the Board is to establish as soon as possible a corresponding school for girls.

Aim.

The object of this trade school is the usual one—to provide skilled mechanical workmen, well trained and thoroughly competent. All shop practice is under the supervision of skilled workmen, who act as foremen and instructors. Both evening and day classes are provided.

Curriculum.

Owing to the prominence of the metal trades in Worcester and the fundamental character of the machinist's trade, the classes so far provided are for boys over fourteen in the machinist's trade, including instruction and practice in pattern-making, tool-making, die-sinking, iron-moulding and blacksmithing. Instruction is also provided in English, history, civics, commercial geography, commercial arithmetic, commercial law, book-keeping, trigonometry, political economy, physics, and chemistry, all of these subjects being taken up strictly in their relation to industry.

Disposal of Products.

On one important subject the Worcester Commission appointed to report on the question of establishing a trade school has made a noticeable pronouncement: Its contention is that if the pupil is to become a skilled workman he must be trained upon high-grade machine products under real shop conditions and approved methods. This, of course, means a shop product. The question, then, is: How shall the products of the school shop be disposed of?

According to the Commission, the objections to the productive school shop may be summarized as follows:—

1. The claim by the manufacturers that goods so produced compete with theirs in the market.
2. The fear of skilled workmen that their opportunities will be reduced by the school production.

Views of Commission.

3. The fear that cheap goods will be sold at reduced prices.
- The position taken by the Commission is that none of these objections can be justly offered if the school shop produces nothing that will unfairly compete with goods manufactured in Massachusetts, if nothing is sold under market prices and if all productions are of a superior quality. For, if so, they will tend to raise, not to lower, the prevailing prices of skilled labour and the productions of skilled labour.

ROCHESTER SHOP SCHOOLS, NEW YORK

Another variety of intermediate industrial schools that de- Organization.
 serves notice is that in operation in Rochester, N.Y. Since Decem-
 ber, 1908, three have been established under the new Industrial Law
 of the State, two for boys and one for girls. An account of one
 of these "Shop Schools" has been published by the Superintendent.
 The school was organized in an old eight-roomed school building
 not otherwise needed for school purposes, and a staff appointed,
 consisting of a principal who teaches part of his time, four shop-
 instructors, a class-room teacher, and an instructor in drawing.

Boys are admitted at any time during the year. The class-room Individual
 work is, accordingly, largely individual. They may also graduate Work.
 whenever they have finished their course, the average time being two
 years.

The school has four departments: cabinet making, carpentry, Departments.
 electrical work, and plumbing.

The cabinet making department is a little factory in itself, with
 glueing room, machine room, assembly room, and finishing room.
 Here there is division of labour, the boys being promoted from one
 branch of the work to another as soon as they have acquired a
 reasonable degree of efficiency. Any article manufactured must Character of
 meet two conditions: Products.

1. It must be something which is needed in the schools, and
 which the Board of Education would otherwise purchase; and
2. It must have an educative value for the pupil. For 1910
 the recognized products were: drawing boards, primary looms,
 pillow looms with heddles, drawing kits, saw horses, sewing boxes,
 manual training benches, umbrella racks, bookcases, desk chairs,
 teachers' sanitary desks, and music cabinets.

The carpentry, plumbing, and electrical shop work taught in the Courses.
 school is much the same as would be taught in any trade school in
 these branches. The peculiarity of the school is the installation and
 repair work which is being done in the various school buildings of
 the city by groups of boys sent out from the shop school.

The following is given as a concrete example of the kind of Installation
 work: "A call comes in the forenoon from a grammar school that and Repair
 the fire alarm system is out of order. That afternoon a group of Work.
 boys visits the school and locates the trouble. The next morning
 they make out a bill of materials needed for the repair work. If
 the job is at all complicated they also make the necessary drawings.
 As soon as the materials are delivered the same group of boys
 returns to the school and makes the proper repairs. In many cases
 the work is carried on under a boy foreman, and only inspected by
 the regular foreman when completed."

Value of
Courses.

On behalf of this school it is claimed that, although no trade can be taught in the school, yet, when the school shop work is supplemented by all kinds of real work under necessarily varying conditions, the opportunities for a thorough grounding are increased. Besides, the installation and repair work is much more interesting to the pupils than work constructed merely for construction's sake, and boys gain confidence in attempting and mastering the problems submitted to them. Moreover, as the materials used in the outside work are not wasted, the cost of instruction in the school is greatly reduced.

Sessions.

The number of periods each week for the various subjects is as follows in hours: Shop work, 15; mathematics, 4; English, 3½; drawing, 5; spelling and industrial history, 2½.

The school day is six hours long, except for the groups that work outside in the afternoon. For these the work-day averages seven and a half hours.

Attitude of
Organized
Labour.

So far the labour unions have shown a most friendly spirit. They approved of the establishment of the school, and are kept fully informed regarding its plans and methods.

III. CO-OPERATIVE INDUSTRIAL SCHOOLS

FITCHBURG HIGH SCHOOL

ESTABLISHMENT

Action of
Manufac-
turers and
School Board.

In connection with the engineering department of the University of Cincinnati, a system of co-operation has been established between the University and the shops of the city, under which the shop takes charge of the practical training of the students, and the University of the theory. The plan adopted was discussed in April, 1908, at a meeting of Metal Manufacturers in New York City. Some Fitchburg manufacturers were present and were greatly impressed with the advantages of such a system. On their return to Fitchburg, a plan was drawn up by the manufacturers of that city for a combination shop and school course and presented to the School Board, with an offer of the use of their shops for the practical instruction of apprentices, if the school would provide the necessary theoretical and academic instruction. This proposal the School Board accepted and the following local industries now provide the shopwork: Saws and knives, steam engines, grinding machinery, pumping machinery, special and woodworking machinery, lathes, planers, railway tools, and general machinery.

CURRICULUM

Co-operative
Industrial
Course.

The course is one of five elective High School courses and is known by the name of the Co-operative Industrial Course. The boys receive instruction in the shops during one week and in the

school the next week. Last session 100 attended, and the cost of the special salaries was \$3,400. The course covers four years, as follows; the figures in brackets are the number of hours a week:

First Year.—*All School Work*: English and current events (5), arithmetic, tables and simple shop problems (5), algebra (5), freehand and mechanical drawing and bench work (8).

Second Year.—*School and Shop Work*: English (5), shop mathematics, algebra and geometry (5), physics (4), civics (2), mechanism of machines (5), freehand and mechanical drawing (6).

Third Year.—*School and Shop Work*: English (5), shop mathematics (5), chemistry (4), physics (4), mechanism of machines (5), first aid to injured (1), freehand and mechanical drawing (6).

Fourth Year.—*School and Shop Work*: English (5), commercial geography and business methods (2), shop mathematics (4), mechanism of machines (4), physics, electricity and heat (4), chemistry (6), freehand and mechanical drawing (5).

CO-OPERATIVE PLAN

The course is a form of the apprenticeship system under which the manufacturer takes the boys in pairs, so that by alternating they have one pair always in the shop and the school has one of the pairs. The course is an elective one which any boy regularly admitted to the High School may take with the approval of his parents. Each Saturday morning at eleven the boy who has been at school goes to the shop and finds out what particular job his alternate has been working on, in order that he may take up the work without delay the next Monday morning.

Scheme of alternation.

As to the academic work: Since the School term is only 20 weeks a year, only such subjects are taken up as are of practical value to the student. Throughout the four years, the object in English is to enable the students to speak and write intelligently. Familiarity with shop terms and their significance is an important factor of the work. For this purpose, the teacher of the English department made a special study of the English the course requires. Current events and industrial history, the daily happenings in the industrial world; the history of the iron industry, factory systems and labour problems; new inventions, and the reading of the mechanic journals are included in the course. The mathematics deal with simple problems in mensuration, fractions, metric system, circular measure, followed by problems in cutting speeds and feeds, belting, gearing, strength of materials, and general cost figuring. Algebra is taken up to give facility in using the formulæ common in trade journals and hand-books, and in understanding simple geometric and trigonometric formulæ. Under mechanism are taken up construction and uses of the various machine tools. The names and uses of every part are learned in the school, as well as in the shop, with the reason for the shapes of the various parts, the

Academic subjects.

kind of material used and their construction, etc. In physics, working problems are emphasized rather than theories; and in chemistry, the nature and qualities of metals and salts, tests that can be applied to fractured metals, hardening and tempering processes. The commercial geography comprises the study of the sources of supply of the various industries, the preparation and methods of transportation, cost of materials, railway systems, water ways, etc. Under business methods is taken up the organization of shop systems, including the receiving of materials, laying out of work, tagging, inspecting, and routing of work throughout the shop; also general office systems. Drawing is, of course, emphasized. Civics and history are essentials of good citizenship, and a careful study is made of the forms of City and State government.

Shop-work.

The shop work consists of instruction in the operation of lathes, planes, drilling machines, bench and floor work, and such other machine work, according to the period of the apprenticeship, as pertains to the particular branch of manufacture in the shop where the boy is employed. The boys receive compensation for their services during the week they are in the shops, at the following rates:

Boys'
Compensation.

For the first year, 10c. an hour; the second, 11c. an hour; and the third, 12½c. an hour; that is, \$5.50 a week, or \$165.00 for the first year; \$6.05 a week, or \$181.00 for the second year; and \$6.78 a week, or \$206.25 for the third year; a total of \$552.75 for the three years. These rates, it may be mentioned, are higher than the former apprentices have been receiving, the manufacturers having raised the scale of their own accord. The wage scale becomes operative at the first of July, when the boys enter upon a trial period of two months. All of the class begin work at this date, a few weeks' vacation being allowed in July or August. The division into pairs is made at the opening of the fall term in September. Every student is given a trial period of two months, beginning immediately at the close of school in June. If it turns out that he has no aptitude or liking for a trade, he takes up some other course in the High School. During this trial period he has the opportunity of finding out what occupation will suit him.

Local opinion.

When I visited Fitchburg, I met one of the leading manufacturers, as well as the Principal of the school. Locally, the plan seems to have strong support. It is claimed that it presents a strong inducement for the boy to remain in school. He can earn some money; in fact he can earn more than he could by going out and taking the ordinary jobs in stores and offices that would be available. Moreover, the payment for the shop work enables parents of limited means to keep their children in school longer than under the usual conditions. I may add that where there is a

vacation week in school, the shops provide work so that the boy is kept off the street.

What is regarded as a strong feature of this co-operative plan is the contract entered into by the boy and his employer. I quote the opinion of the High School teacher who has general charge of the school work:

Importance of
the contract.

The modern boy is a very unstable article; he tries this and that and is loathe to settle on one thing. After he has had a trial period of two months and is satisfied he wants to learn a trade, his parents agree that he shall stick to it for three years, and the manufacturer on his part agrees to teach him the various branches of the trade designated in the agreement. The arrangement is mutual: Each agrees to give the other a square deal. I found, in a trip through the West last summer, that only those places that had this written agreement between the apprentice and the employer had any success with their apprenticeship system.

When in Fitchburg, I called upon one of the representatives of organized labour who had a boy taking the course, and found that this representative was satisfied with the situation. I found later, however, that philanthropic and social workers, and organized labour in particular, are strongly opposed to this form of co-operative plan, chiefly on the ground that the manufacturer selects and controls the boy and that it does not give equal rights to everyone. A Committee of the American Federation of Labour reported in 1910, at its meeting in Toronto, that there is justification in condemning any system of public instruction privately controlled, or any scheme of private selection of pupils, and calls attention to the fact that such a plan is being fostered by manufacturers' associations. Possibly, the fact that Fitchburgh, as the result of an unsuccessful strike, is now an "open shop" city has a bearing upon the attitude of all parties towards the question.

Attitude of
Organized
Labour.

Below I give the rules and conditions under which special apprentices taking the four years' co-operative industrial course are received for instruction at the works; also, the apprenticeship agreement in which the parties are the apprentice, his parent or guardian, and the employer:

Rules and Conditions.

1. The applicant for apprenticeship under this agreement must have satisfactorily met requirements for entrance to this course at the High School.

2. The apprentice is to work for us continuously, well and faithfully, under such rules and regulations as may prevail, at the works of the above company, for the term of approximately 4,950 hours, commencing with the acceptance of this agreement, in such capacity and on such work as specified below:—

Lathe Work, Planer Work, Drilling, Bench and Floor Work, and such other Machine Work, according to the capability of the apprentice, as pertains to our branch of manufacturing.

This arrangement of work to be binding unless changed by mutual agreement of all parties to this contract.

3. The apprentice shall report to his employer for work every alternate week when the High School is in session, and on all working days when the High School is not in session, except during vacation periods provided below, and he shall be paid only for actual time at such work.

4. The apprentice is to have a vacation, without pay, of two weeks each year, during school vacation.

5. The employer reserves the right to suspend regular work wholly, or in part, at any time it may be deemed necessary, and agrees to provide under ordinary conditions other work at the regular rate of pay, for the apprentice during such period.

6. Should the conduct or work of the apprentice not be satisfactory to employer or to the High School authority, he may be dismissed or suspended for a time at any time without previous notice. The first two months of the apprentice's shop work are considered a trial time.

7. Lost time shall be made up before the expiration of each year, at the rate of wages paid during said year, and no year of service shall commence till after all lost time by the apprentice in the preceding year shall have been fully made up.

8. The apprentice must purchase from time to time such tools as may be required for doing rapid and accurate work.

9. The said term of approximately 4,950 hours (three-year shop term), shall be divided into three periods as stated below, and the compensation shall be as follows, payable on regular pay days to each apprentice.

For the first period of approximately 1,650 hours.....10 cents per hour.

For the second period of approximately 1,650 hours....11 cents per hour.

For the third period of approximately 1,650 hours.....12½ cents per hour.

10. The above wage scale shall begin the first day of July preceding the apprentice's entrance upon the first year of shop work of the High School Industrial Course.

The satisfactory fulfilment of the conditions of this contract leads to a diploma, to be conferred upon the apprentice by the School Board of Fitchburg upon his graduation, which diploma shall bear the signature of an officer of the Company with which he served his apprenticeship.

Apprenticeship Agreement.

Agreement Among the Three Parties.

This Agreement made the.....day of.....
 A.D., 19 , by and between.....of.....
 (Employer)
 party of the first part; and.....of.....
 (Co-operative Student)
 party of the second part; and.....of.....
 (Bondsman)
 party of the third part.

Witnesseth. That the party of the second part shall from the date hereof, for the term of three years (4,950 hours, divided into three periods of 1,650 hours a year, as stated in the "Rules and Conditions,"), and so much longer as may be necessary to make up lost time, become and be the apprentice of the party of the first part to the art or trade of ,

and that said parties of the first and second parts will well and truly do and perform all things required to be done and performed by them in and by said Rules and Conditions of the Co-operative Industrial Course.

And said party of the third part, in consideration that the parties of the first and second part have with his knowledge executed this agreement, covenants and agrees for himself and his assigns, heirs, executors or administrators, with the party of the first part that the party of the second part shall well and truly do and perform all things required to be done by him, in and by this agreement, and in case said party of the second part shall in anywise violate any of the terms and provisions of this agreement or said Rules and Conditions, to pay to the party of the first part the sum of One Hundred Dollars, as ascertained and liquidated damages for such breach of contract.

In Witness whereof, said party of the first part has caused these presents to be signed and sealed by its for this purpose authorized, and said parties of the second and third parts have hereto set their hands and seals this day and year first above written.

Signed and Sealed.....

(Employer)

In presence of.....

Signed and Sealed.....

(Apprentice)

In presence of.....

Signed and Sealed.....

(Bondsman)

In presence of.....

Agreement of Relative or Guardian.

I.....of the above named
(Relative or Guardian)

.....do hereby give my consent to
(Apprentice)

his entering the employ of the said.....
(Employer)

upon the terms named in the above articles of agreement; and I further agree that in consideration of such employment the wages or earnings of my said.....shall be paid directly to him, and I hereby release

Son or Ward)

all claim that I now have or may have hereafter thereto.

Dated at.....this.....day of.....19

Signed and Sealed.....

(Relative or Guardian)

In presence of.....

This is to Certify that the within named.....
completed his term of apprenticeship.

.....(Seal)

BEVERLEY CO-OPERATIVE TRADE SCHOOL, MASSACHUSETTS

ESTABLISHMENT

An institution on the co-operative plan, but of a different character from the Fitchburg one, has been established at Beverley, Massachusetts. I was not able to visit it, but I have obtained information regarding it from the Principal by correspondence, and from Deputy Commissioner Prosser, of the Boston Board of Education, at an interview with him in Boston. Last year, a Beverley Commission on Industrial Education reported in favour of co-operation between the city schools and the United Shoe Machinery Company, the chief industry of the city, with about 3,000 employees. The plan adopted is as follows:

CO-OPERATIVE PLAN

Separate
Department
in Factory.

Plan of
Operation.

Committee on
Industrial
Education.

A separate department has been organized in the factory of the company, equipped with all the necessary machinery tools for 25 boys at one time. The company furnishes all materials and keeps the accounts. The machinery manufactured is inspected by regular factory inspectors and when satisfactory goes into the regular stock of the United Shoe Machinery Company. One-half the regular piece price is paid each pupil for all his product that passes inspection. The company also makes up the deficit between the earnings of the practice shop as shown by the accounts and the cost of maintenance of the practice shop, including the salary of the instructor while in the shop. The hiring of the shop instructor, the foreman, and the management of the shop is in the hands of the Committee on Industrial Education. This Committee consists of five members of the School Committee, the Mayor, and one representative of the manufacturer furnishing the practice shop, the Superintendent of Schools being *ex officio* Secretary and Executive Officer. The Committee has full charge of the school and practice shop, subject, however, to approval by the State Board of Education. The manufacturer furnishing the practice shop has the right to withdraw his co-operation on reasonable notice.

Being under a special Committee, the School is independent of both the factory and the High School, though sharing in the facilities of both.

Work in
High School.

In the High School the work is carried on in a laboratory assigned for the exclusive use of this school. The other school laboratories and class rooms are used in the afternoons when not occupied by the regular High School classes. All the work is carried on in separate classes with different hours from the regular High School and with a distinct course of study and a corps of instructors selected to suit the needs of the classes. The school day

consists of eight hours, there are no home lessons, and the factory hours and discipline are the same as for employees.

To be admitted, the candidates must be fourteen and have completed the sixth grade of the elementary school. Many, however, have attended the High School for a year or two. The number is limited to fifty, who are in two groups of twenty-five each, which alternate between the factory and the school building. Each group is under the charge of the machinist instructor, who accompanies it at both school and factory. The advantages of this plan are that the instructor correlates the work more closely. The wider experience makes him also more expert; for the work of the factory prevents his being too theoretical in his instruction, and the experience in the school makes him a better teacher at the factory.

Admission
tests.

Organization.

CURRICULUM

It is intended that two years shall be given to the introductory course, followed probably by one or two of more advanced work and specialization. As, however, the school is in the experimental stage, the course has not been formulated beyond the first year.

The course of study includes:

At the Factory: Operation of different machine tools on various classes of work, and specializing on machine tools for which special aptitude is shown. Each pupil makes a freehand mechanical sketch and writes a description in notebook of the various articles manufactured by him.

At the School: (1) Drawing: mechanical sketching, with all necessary dimensions, working drawings, perspective, industrial design, machine design. (2) Shop Mathematics: arithmetic and mensuration, algebra, geometry, trigonometry, with shop tables and the use of instruments of precision. (3) Machinist's literature, current and historical and modern machine shop practice. (4) Science: mechanics, electricity as applied to machinery, chemistry of materials and their manipulation. (5) Business and social forms and practices, and personal, social and civic duties.

ADVANTAGES OF THE PLAN

The following advantages are claimed for this variety of the co-operative plan:

1. The work-shop is equipped by the manufacturer with machine tools of the very best and latest type.
2. The High School is modern in its equipment, and keeps pace with improvements in appliances and laboratory apparatus.
3. The School has been established without a large initial expense for buildings and equipment.
4. Not only the industrial experience of the manufacturer is utilized, but his interest and co-operation are assured.
5. The School is distinctly a Public School, at both the High School and the factory. No indenture to the manufacturer is re-

quired, and there can be no suspicion, as is the case in the Fitchburg School, that the boys are exploited for the benefit of the manufacturer. The pupil may leave at any time. He receives in wages one-half the regular piece price, and all his work at the factory is done under the sole direction of the mechanical instructor who teaches him at the school.

6. The product of the pupil's work is used to pay the cost of the raw materials and to pay him for his labour in proportion to his competency as a workman. The other half of the regular piece price is credited to the funds of the school at its cost price to the factory. So far, any deficit has been made good by the manufacturer; but, as the pupils become more skillful, it is expected that deficiencies will disappear. It is also provided in the agreement with the manufacturer that, if any profits should accrue, they will belong to the school and be distributed to the pupils in increased wages, or in whatever way is deemed advisable by the Board of Trustees.

IV. TECHNICAL HIGH SCHOOLS

SPRINGFIELD TECHNICAL HIGH SCHOOL, MASSACHUSETTS

GENERAL

Confused
nomenclature.

The Springfield Technical High School illustrates the looseness with which such schools are named. At first a manual training department of the Public Schools, it was, in 1898, reorganized as an independent school, under the name of the Mechanics' Arts High School and conducted in a building which had been a private school for teaching the trades. But, as this association and the opening of a new Public Evening Trade School in the same building with the same equipment and teachers, had led many to suppose that the day school was for the same purpose, the name was changed in 1904 to the Technical High School, to which it has now a just claim.

Accommoda-
tions.

When I visited the school about ten years ago its accommodations were poor and its equipment limited. It is now housed in a magnificent building, and possesses equipment for both boys and girls of a very complete character, at a total cost for site, building, and equipment of about \$280,000.

Character of
School.

The school is an independent Public High School, free to boys and girls who live in Springfield. The entrance qualifications are the same as for those who enter the Central High School of the city, which, I may mention, cost about \$400,000.

CURRICULUM

General
character.

The programme includes the English language and literature, mathematics, science, history, French, German, and Latin of a High School course; it also recognizes the principle that the activi-

ties of home life, or of an industrial or business career, should begin in the School, and it provides that in all the courses the boys shall take drawing and shop work, and the girls sewing and cookery.

There are three courses of instruction, each of which offers ^{Three Courses.} from twenty to thirty hours per week throughout each of the four years. They differ, however, in the subjects and the relative amount of time given to practical work and the literary or scientific studies. The aim in all the courses is educational and practical, not narrowly vocational. No attempt is made to teach the mechanic a building trade as such. The courses are as follows:

I. *The College Preparatory Course*: This course is based on the requirements for admission to the various colleges and schools of technology. Girls receive at the same time a training in domestic science, and boys in drawing and shop-work.

II. *The General Scientific Course*: In addition to general academic training, instruction is given in drawing and design in the elements of the mechanic arts, and in the principles of domestic science, which, in this course, are of more importance than in the College Preparatory or the Commercial Course. For those who wish to place special emphasis on practical work, a sub-division of the course has been provided in which less literary and mathematical study is required. In the third and fourth years specialization in the work of the drawing room and the shops is permitted, and the students taking this sub-division become so well grounded in the principles of the fundamental mechanical trades that their term of apprenticeship, if they take one, may be materially shortened.

III. *The Commercial Course*: This course combines special consideration of the ordinary commercial branches, with a good, general academic course. This department prepares not only good book-keepers, stenographers, and typewriters, but it provides a general course that will enable students to earn promotion to the more responsible positions.

As indicative of the relation between the school and the factories, I may mention that more than 60 per cent. of those who have been trained in the Technical High School are engaged in industrial employment of some kind, often in positions of leadership. Moreover, about 25 per cent. of the graduates of the Technical High School have taken College courses and are filling engineering positions of great responsibility.

Relation of
Schools to
Factories.

General Scientific Course

The following are the technical courses:

1. French, German and Latin are electives on the understanding that, if chosen, they will be continued for at least two years.
2. In order to meet an unusual requirement or to provide a programme better suited to the needs of any pupil, the Principal, with the approval of

the Superintendent, may authorize the omission of any subject and the substitution thereof of an equivalent subject.

3. Figures in brackets after each subject indicate lesson periods of 45 minutes each. Unprepared lessons generally cover two periods or 90 minutes.

4. The number of prepared and of unprepared lessons per week are given for each division.

A.—For Boys

FIRST YEAR.

Division (a)—

English (3), Algebra (5), History (5 mos.) (5), Physics (5 mos.) (5), French (elective) (5)—13—18 prepared lessons.

Mechanical Drawing (4), Wood Turning, elementary pattern making, metal work (with French elective 6) (10), Physical Training (2)—9—7 unprepared lessons.

Division (b)—

English (3), Algebra (5), History (5 mos.) (5), Physics (5 mos.) (5)—13 prepared lessons.

Mechanical Drawing (4), Wood Turning, Elementary pattern making, metal work (10), Physical Training (2)—9 unprepared lessons.

SECOND YEAR.

Division (a)—

English (3), Geometry (4), Physics (5), French (4)—14 prepared lessons.

Mechanical Drawing (4), Pattern Making and Moulding or Cabinet Making (5 mos.) (8), Forging and Vice Work (8), Physical Training (2)—8 unprepared lessons.

Division (b)—

English (3), Geometry (4), Physics (5), History (4)—14 prepared lessons.

Mechanical Drawing (4), Pattern Making and Moulding or Cabinet Making (5 mos.) (8), Forging and Vice Work (5 mos.) (8), Physical Training (2)—8 unprepared lessons.

THIRD YEAR.

Division (a)—

English (4), Chemistry (3 prepared) (6), Advanced Algebra and Solid Geometry (4), Elective (4)—15 prepared lessons.

Elective Subjects: History (4), French (4), German (4).

Mechanical Drawing (4), Machine Shop Practice (6), Physical Training (2)—7 unprepared lessons.

Division (b)—

English (4), Shop Mathematics (4), Elective (4—5).

Elective Subjects: History (4), Bookkeeping (5), Typewriting (5), Stenography (5)—13—16 prepared lessons.

Mechanical Drawing (4), Machine Shop Practice (6), Physical Training (2). Elective: Extra Shop or Drawing Room Practice (4)—9—7 unprepared lessons.

FOURTH YEAR.

English (4), Trigonometry and Applied Mathematics (5), Electives (8—10 prepared) (10—11).

Elective subjects: History and Civics (5), Advanced Physics (3 prepared) (6), Advanced Chemistry (3 prepared) (6), German (5)—17—19 prepared lessons.

Mechanical Drawing (6), Machine Shop Practice (4)—5 unprepared lessons.

Division (b)—

English (4), Trigonometry and Applied Mathematics (5), Electives (5 prepared) (10—11).

Elective subjects: History and Civics (5), Bookkeeping (5), Typewriting (5), Stenography (5).

Architectural Drafting, Machine Drafting, Tool Making, Pattern Making, Cabinet Making, Electrical Construction (4 to 6).

Mechanical Drawing (6), Machine Shop Practice (4).

Elective: Extra Shop or Drawing Room Practice (4 to 6)—7—8 unprepared lessons.

B.—For Girls

FIRST YEAR.

Division (a)—

English (3), Algebra (5), History (3), Science (3), French or Latin (elective) (5)—14 prepared lessons.

Design (4), Household Arts (4 or 6), Physical Training (2)—7 unprepared lessons.

Division (b)—

English (3), Algebra (5), History (3), Science—14 prepared lessons.

Design (4), Household Arts (8), Physical Training (2)—8 unprepared lessons.

SECOND YEAR.

Division (a)—

English (3), Science (3), Household Science (3 prepared) (5), French or Latin or German (5), Elective (4—5)—14—19 prepared lessons.

Elective subjects: Geometry (4—5), Bookkeeping (5), Typewriting (5).

Design (4), Household Arts (4), Physical Training (2)—6 unprepared lessons.

Division (b)—

English (3), Science (3), Household Science (3 prepared) (5), History (4), Elective (5)—13—18 prepared lessons.

Elective subjects: French or German (5), Bookkeeping (5), Typewriting (5).

Design (4), Household Arts (4), Physical Training (2)—6 unprepared lessons.

THIRD YEAR.

Division (a)—

English (4), Chemistry (3 prepared) (6), Hygiene and Sanitation (2), Elective (1 required) (3—5)—13—14 prepared lessons.

Elective subjects: French or Latin (3—5), History (4), Advanced Algebra and Geometry (3), German (4—5), Bookkeeping (5), Typewriting (5), Stenography (5).

Design (4), Household Arts (4), Physical Training (2)—6 unprepared lessons.

Division (b)—

English (4), Chemistry (3 prepared) (6), Hygiene and Sanitation (2), Elective (1 required) (4—5)—13—14 prepared lessons.

Elective subjects: History (4), French or German (5), Bookkeeping (5), Typewriting (5), Stenography (5), Household Science (Advanced) (4).

Design (4), Household Arts (4), Physical Training (2)—6 unprepared lessons.

FOURTH YEAR.

Division (a)—

English (4), Household Chemistry (5 prepared) (7), Elective (1 required) (5)—14—15 prepared lessons.

Elective subjects: History and Civics (5), French or Latin (3 or 5), German (3 or 5), Advanced Physics or Advanced Chemistry (6).

Design (4), Household Arts (4)—4 unprepared lessons.

Division (b)—

English (4), Household Chemistry (5 prepared) (7), Elective (1 required) (5).

Elective subjects: History and Civics (5), French or German (3 or 5), House Decoration, House Designing, Food Preparation, Typewriting (5)—14 prepared lessons.

Design (4), Household Arts (4)—4 unprepared lessons.

Science and Art for Girls.

FIRST YEAR.

Science: Elementary Science, Physics, Plant Physiology.

Design: Design for basketry, leather work, weaving, stencilling, incidental lettering.

SECOND YEAR.

Science: Physiology, Physics.

Household Science: Preparation of Food, composition and nutritive value.

Design: Designs for pottery, metal work, wood furniture, constructive details.

THIRD YEAR.

Science: Chemistry.

Household Science: Hygiene and Sanitation, consideration of site of house, plumbing, heating and ventilation, lighting, furnishing.

Design: Architectural drawing, relation of house to surroundings, planning of house, details of construction, interior decoration, relation to purpose, proportion, colour schemes, hanging of pictures, materials for decoration.

FOURTH YEAR.

Household Science: Household Chemistry, dietetics, household management, cost of living, table serving.

Design: Special problems for handwork elected, design applied to dress.

EVENING SCHOOLS

Aim.

In connection with the school is an Evening School of trades, established in 1898, the object of which is to give men who are already employed an opportunity to make themselves more efficient

workmen, and to supplement the imperfect and highly specialized training of modern shops by presenting a greater variety of work than would be open to them under the present factory system. These classes are very popular, and the various city governments have, almost invariably, voted promptly the sums needed for their support. The returns from the sale of tools and other apparatus made by the machine shop classes have reduced considerably the cost of maintenance. The classes are free to all over fourteen who are residents of Springfield, but a fee of \$5.00 is charged each student for materials and other incidental expenses in machine shop practice and in pattern-making. In plumbing the fee is \$8.00, and in the laboratory classes in electricity, \$4.00. Non-residents are charged \$10.00, or \$15.00, according to the classes they take. The school lasts twenty-four weeks, opening the second week in October, and the sessions are from 7.15 to 9.15 p.m., three evenings a week. The different departments are as follows:

Disposal of Products.

Fees.

Departments.

Mechanical Drawing, including Machine Drawing and Architectural Drawing; a three-years' course.

Machine Shop Practice and Tool Making; a two-years' course.

Wood Turning and Pattern Making, with Cabinet Making and Furniture Making. Courses adapted to circumstances.

Plumbing, including the subjects of Water Supply and Sanitary Drainage; a two-years' course.

Shop Mathematics: Two courses—elementary and advanced.

Electricity: Two courses—elementary and advanced.

In general character the above courses are the same as those to be found in other evening trade schools.

Besides the evening trade classes, Springfield provides Evening Elementary Schools, an Evening Art Drawing School, and an Evening High School with a preparatory department. Moreover, in January, 1909, a new departure was inaugurated in the evening work, by the organization in the Technical High School Building of classes in domestic science, dress-making, and home decoration.

Other Evening Schools.

As to attendance at the Evening Schools: The report for 1909 shows an enrolment of 1,393 at the general Elementary Schools, 99 at the Drawing School, 148 at the preparatory department of the High School, 720 at the High School, and 447 at the School of Trades; and this in a city of about 80,000 population.

Attendance.

VOCATIONAL SCHOOL

But while Springfield has provided technical education of a broad character for students of the High School grade, and specialized evening instruction for the workmen, until recently it did not

provide special instruction for the trades in the case of those students who are unable to avail themselves of a High School education.

Cause of establishment.

In the manufacturing establishments of Springfield many trades are represented; the last report of the Massachusetts Bureau of Statistics credits it with 184. It has, accordingly, been plain that it would be altogether too expensive to provide training for all. Moreover, some of the industries are highly specialized, and employ operatives who, after a few weeks or a few months, become almost as automatic as the machines they control. To meet the situation, last autumn the school board organized a Vocational School.

Aim.

The school is one of the intermediate industrial type, and is intended to give the future workman an acquaintance with the fundamental principles of hand and machine work, and to help him to acquire some skill in the use of tools and some knowledge of the processes and principles of construction; to teach him something about the raw materials used in local industries, the source of such materials, the geographical conditions of the regions they come from, and the methods of transporting them to the factory, and to give him also some notion of factory processes, the markets for which the products are prepared, the organization of a factory, the work of apprentices, the wages they receive, and the conditions of wage increase. Such knowledge is intended to help the boy to grasp industrial conditions and to solve industrial problems. The school also provides courses in practical mathematics, mechanical drawing, and English composition. History is also taught with emphasis on its commercial and industrial phases.

Plan.

To carry out the scheme, the following plan was put into operation last autumn, and is reported by the Springfield Superintendent of Schools to have so far been a successful experiment:

Two groups of boys from the elementary schools, of about twenty-five each, have been taught by two trained craftsmen, one a woodworker and the other an ironworker. The boys selected were at least fourteen years of age and were fitted for the seventh or eighth grade of the elementary school work. The course is intended to be one of three or four years, and to prepare boys for entrance into the more important hand-tool and machine-tool trades after shortened apprenticeships.

Each boy spends half the year in woodwork, and the other half in ironwork, in order to test his aptitude for trade and to find out which trade he is most fitted for. In the second year he will make a choice of the line of work he will take up in the school. In the forenoon the boys are in class-rooms of the elementary schools, where they will take up academic work and mechanical drawing,

and in the afternoon they are in the shops of the Technical High School.

An extension of this scheme was also provided when last summer a six weeks' Manual Training Vacation School for boys was opened with, it is reported, a good attendance and excellent results.

Vacation
Manual
Training
School.

STUYVESANT HIGH SCHOOL, NEW YORK CITY

ACCOMMODATION AND EQUIPMENT

The Stuyvesant High School provides technical instruction, but for boys only. The building covers an acre of ground, and in the five stories and basement contains actual floor space of about five acres, providing for about 1,200 day pupils. The attendance at the evening classes is nearly as great. The accommodations and equipment are so excellent as to deserve description: Forty-eight class rooms, three physical laboratories, three chemical laboratories, three lecture rooms, nine draughting rooms, eight carpenter rooms, three wood-turning and pattern-making shops, one metalwork shop, one foundry, two blacksmith shops, one machine shop, one special laboratory for electricity, one construction and milling room, one blue-printing room, one photographic dark room, a library, an auditorium with seating capacity for 1,500, a lunch room, a gymnasium nearly a hundred feet square, with elevated running track and visitors' gallery, a locker room with over 2,000 lockers for individual students, and a lavatory with ten shower baths. All the shops and rooms have excellent equipment. The site cost \$365,000, the building \$1,000,000, and the equipment \$200,000, a total of \$1,565,000.

Accommo-
dations and
equipment.

The salaries cost \$150,000 a year; the material, \$15,000; and the other items of maintenance \$20,000. The total attendance in the Manual Training Department is 1,900, and each pupil cost \$100 a year.

Maintenance.

CURRICULUM

Two courses are provided; the work done is of a higher character than in most of the other Industrial or Technical Schools:

1. *The General Course*, for those boys who wish to prepare directly for schools of medicine, law, dentistry, or pharmacy; for schools of electrical, mechanical, or civil engineering; or for the academic department of any college. Here are included the usual academic subjects, with free-hand and mechanical drawing in the first and second years, and mechanical drawing in the third and fourth years; joinery in the first year; wood-turning, pattern-making, moulding, and sheet metal work in the second year; forging in the third year; and machine shop construction in the fourth year,

General
Course.

Industrial
Course.

for which, however, a student preparing for a technical college course may substitute an academic subject.

2. *The Industrial Course*, for those boys who intend to go directly from the High School to positions in machine shops, in building construction, electric light and power plants, chemical departments of manufacturing establishments, in commercial industries requiring technical knowledge and skill or in the different departments of City Government.

In this course the number and the extent of the academic subjects are somewhat less than in the first course. In the following statement, the number in brackets is the number of class periods each week; as will be noticed, no choice of study is allowed in the first three years, but a wide range is allowed in the last year:

First Year: English (5), algebra (5), freehand drawing (2), mechanical drawing (4), joinery and cabinet making (10), music (1), physical training (2).

Second Year: English (3), plane geometry (4), chemistry (5), freehand drawing (2), mechanical drawing (4), wood-turning, pattern making and joinery (10), physical training (2).

Third Year: English (3), plane geometry and trigonometry (3), physics (5), modern history (3), mechanical and architectural drawing (1), forging and machine shop practice (10), physical training.

Fourth Year: English (3), shop mathematics (3), American history and civics (4), advanced chemistry or economics or industrial and Commercial Law or applied mechanics, steam and electricity (4), mechanical and architectural drawing (4), special shop work in Laboratory Practice in one of the following electives:

1. Building Construction; carpentry; sanitation, including heating and installation; electric wiring and installation.
2. Advanced forging and tool making.
3. Advanced pattern making and foundry practice.
4. Advanced machine shop practice.
5. Industrial chemistry.

BOSTON GIRLS' HIGH SCHOOL OF PRACTICAL ARTS

GENERAL

Aim.

This school differs from the industrial, or trade school, in providing for all a good four years' academic course and in preparing girls for the duties of the home as well as for trades. It is a connecting link between the ordinary Trade School and the Technical High School.

Departments.

The academic departments are English, history, mathematics, science, art, and French and German. The Principal, however, informs me that on account of their comparative unimportance, probably hereafter no modern language will be taken up. As far as possible the academic subjects are given a practical application;

thus, for example, the pupil is taught both how to prepare sulphur dioxide and how to bleach the straw for straw hats. Instruction is given throughout the course in choral singing and physical training.

The Art department deserves special notice. Its object is to cultivate taste through a study of the principles of beauty and their application to the problems of dress and the home. It includes representation, which stimulates observation and expression; construction, which teaches the facts of form and the making of drawings for the work-shop; mechanical drawing, which necessitates accuracy in measuring; composition and design, which include the analytical study of the principles of beauty and colour harmony; costume designing; house decoration and furnishing.

The Industrial Departments are household science and arts, sewing, dress-making, and millinery. Besides fitting girls for home-making, the instruction in practical arts insures to those who seek employment places of responsibility in the industries they have studied at school.

The terms of admission are the same as those of the other High Schools in Boston and are about the same as those we prescribe in Ontario.

CURRICULUM

Following is a summary of the programme of studies:

In the first year all take the same subjects; there are no elective courses. In each of the second, third and fourth years, a choice of one of the following elective courses is allowed: Dressmaking Course (10), Millinery Course (10), Household Science Course (10).

NOTE.—The number after each subject is the number of periods a week devoted to it, each period being 45 minutes long.

First Year.—Required: English (5), history (2), mathematics (4), art (4), sewing (6), cooking and housewifery (4), choral practice (1), physical training (2).

Second Year.—Required: English (4), history (2), French or German (3), chemistry (4), art (5), choral practice (1), physical training (1).

Third Year.—Required: English (4), history, civil government (2), French or German (3), biology, one-half year (2), physics, one-half year (2), art (5), choral practice (1), physical training (1).

Fourth Year.—Required: English (4), French or German (3), household accounts, one-half year (2), home nursing, one-half year (2), economics (2), art (5), choral practice (1), physical training (1).

As this school is one of the best I know of which provide trade instruction of a high character and good all-round culture for girls of the secondary grade, I give the details of the practical courses:

Dressmaking

FIRST YEAR.

White Work: Review of sewing stitches on a model. Hand stitching. Running. Over-seaming. Hemming. Buttonholes. Gathering. Putting on a band.

Care and use of sewing machines.

Garments, including hand and machine sewing. Each to be planned, drafted, cut, and fitted by pupils:—

Apron:—(a) Machine: Ruffle, hems, tucks, straight bands, straight facings. (b) Hand: Fancy hem stitches.

Drawers: Stitching curved seams. Cutting and placing of yokes. Bias facings. Straight band. Placket. Joining lace and embroidery.

Kimono: Tailor basting. Seam finishings (cat stitch, open and closed seams). Scalloped edge. Brier stitching. French embroideries, etc. (Solid, eyelet, French knot.)

Night Gown: Draft with yoke. Draft princess (make either). Sleeve (circular, puffed, straight).

Corset Cover and Skirt, or Chemise: Setting in of lace. French embroidery. Rolling hems. Whipping ruffles.

Hemming, marking, and darning table linen. Patching. Mending flannel. Mending and footing stockings. Mending gloves.

SECOND YEAR.

Drafting: Skirts, shirt waists. Make models of different plackets and seam finishings. Cut, fit, and make a shirt waist suit. Plaids. Stripes. Bias folds. Pippings.

Tailored Waist: Neck band. Stiff cuff.

Crochet Stitches: Drawn work.

Lingerie Dress: Flounces. Laces. Embroideries from original designs. Making medallions. Mending lace. Transferring embroideries. Chemisettes. Undersleeves.

Orders taken for shirt waist or plain skirt. Shop methods.

THIRD YEAR.

Pattern Making: Plain skirt modified for pleated skirts, and different fancy models.

Circular skirts. Circular gored skirts. Drafting for close fitting waist and Princess dress. Materials, wool and silk. Unlined tailored skirt. Pressing. Seam finishings—Overcast. Bound, Pinked. Notched. Waist, lined and unlined. Drop skirt. Lined waist, boned (model), with cases, without cases. Lined skirt—Stiffening, braid, velveteen, etc. Mending woollens. Mending heavy lace with lace stitches. Making trimmings. Shirrings. Cordings.

FOURTH YEAR.

Draft Patterns for all styles. Tailored coat. Skirt. Graduation dress. Evening dress to order.

Millinery.

FIRST YEAR.

Bandeaux: Of buckram. Side. (Covered plain of side, both sides, and edge). Of wire.

Folds: Cutting, piecing, and making. Plain folds. French folds. Roll hem. Teaching cat stitch, slip stitch, etc.

Frames.—Buckram: Taking measures, cutting patterns, making covering wires. Covering frame with canton flannel, binding edge, lining. Finishing with folds. Talks on materials—silk and velvet. Renovating—silk and velvet. Ornaments made from copy and original design.

Wire frames: Made from model hats. (1) One piece frames. (2) Two piece frames. These covered with crinoline as a foundation for other covering.

A small wire frame (dolls') from original design. Covered with straw (first straw sewing) and finished as a review of principles previously taught.

Visit Spring openings and make wire frames in prevailing style, and cover with straw, shirrings, rim facings, puffed edges.

SECOND YEAR.

During this year use the real materials, velvets, ribbons, flowers, lace, etc. Consider cost of each article made.

Bow Making: Wiring, edging with straw, etc., rosettes, lining velvet for trimmings, ornaments.

Felt Hat (old): Renovate, brace, face, put on folds, copy a simple trimming.

Frames for bonnets and toques, covered with real materials, as velvets, fancy braids, chenilles, etc. Baby's bonnet.

Renovating: Flowers, lace, wire lace. Make wire frames. Cover with straws in combinations, with fancy crowns, and brims. Re-shaping old style hats by taking out braid and adding more by piecing, colouring. Trim same. Other practice in trimming.

THIRD YEAR.

Renovating and curling feathers. Visit openings, and make sketches of hats and trimmings, from which trim felt hat, and make frame, cover and trim. Modify the prevailing styles to suit individuals. Make hat from original design. Fur sewing. Making of and trimming hats with fur. Mourning work. Buying materials. Taking orders.

During this year the pupils will buy materials, estimate cost of hats, estimate fair profits, considering a trade milliner's expenses. Make hat for sale.

The following are the articles made:

FIRST YEAR.

5 different kinds of Bandeaux; 1 Buckram hat frame, made and covered; 3 different ornaments of silk and velvet; 2 wire frames; straw mending; 1 miniature hat, wire frame, covered with straw, trimmed, original design; 1 wire frame covered with crinoline and straw and faced with shirred mull; 1 hat of original design, complete, for student's wear; 3 different ornaments of straw.

The above are required of all girls. Some do extra pieces.

Household Science.

FIRST YEAR.

Care of kitchen. Building and care of fire.

Foods: Definitions. Reasons for cooking. Water.

Carbohydrates: Cereals, starchy vegetables, green vegetables, fruits, sugar—candy.

Fats and Oils: Sources. Uses in cooking. Salads, butter balls, whipped cream, soap.

Beverages: Coffee, tea, chocolate, cocoa.

Proteids: Milk—chese, white sauce, milk soups. Eggs—Soft cooked, hard cooked, poached, scrambled, scalloped, soft custard, baked custard, egg vermicelli. Meats—Cuts of meat, soup stock, braised beef, steak—Hamburg steak, hash. Fish—Boiled, broiled, baked.

Albuminoids: Gelatine, jellies, snow pudding.

Doughs and Batters: Baking powder biscuits. Muffins. Popovers. Plain cake. Cookies.

Frozen Mixtures: Sherbet. Ice cream.

Left-overs.

Sorting clothes. Removal of stains. Preparation of water. Starching
Care of line. Drying. Ironing. Folding.

Practice on: Bed linen, body linen, table linen, woollens, laces, silks.

Cleaning windows, paint, woodwork, metals.

SECOND YEAR.

Preserving and Canning: Fruits and vegetables. Soups with soup
stock foundation. Salads—Mayonnaise dressing. Custards. Omelets.
Souffles. Meat—Roasts, poultry. Fish—To skin, to bone, to fillet, to serve.
Gelatine—Fruit jelly, Bavarian cream, food in aspic jelly. Pastry. Fried
Food. Bread. Biscuits—buns. Cakes—cookies. Frozen mixtures—Ices
ice cream, Mousse.

Study of Foods: Season. Care. Price.

Buying, planning, and serving meals for a certain price.

Practice in housekeeping in a model home, care of storeroom.

THIRD YEAR.

Preserving. Invalid cookery. Study of dietaries with prices for babies
school children, aged people of different occupations. Cooking and serv-
ing meals (individual responsibility). Breakfasts, luncheons, dinners
suppers.

FOURTH YEAR.

Cost of household furnishings and decorations, and cost of living base
on incomes. Food, rent, light, heat. Balance food values for menus cov-
ering several days, use of left-overs.

Each student to plan and cook entire meal. Practice in catering for
small parties.

V. COMMERCIAL HIGH SCHOOLS

HIGH SCHOOL OF COMMERCE, BOSTON

GENERAL

Aim.

This school, which now occupies temporary quarters, is
special school for higher education in commercial subjects. More
elementary courses are provided in the High Schools. As stated
in the programme, the object of the school is to combine instruction
in general high school subjects with instruction in the specific sub-
jects of commerce. The general subjects are, however, taught with
a constant view to preparing the pupil to use them in business, and
to this end they are centred about the specific work in commerce.
The admission test is the same as that in the other High Schools.
For graduates of the High Schools a more advanced course is also
provided.

Admission
tests.

The course of study allows a student to prepare himself for one
of the three main departments: Secretarial Work, Buying and Sell-
ing, and Accounting.

CURRICULUM

The subjects taken up are as follows, the number of weekly periods being given after each subject:

English: 4 for three and one-half years, commercial English, advertising, correspondence, first half fourth year.

Modern Languages: German, 4 for three years, 3 for one year, French or Spanish, 3 during second, third, and fourth years.

Economics and History: General history, 3 during first year. Modern history, 4 first half third year. Economic history, 4, second half of third year. Commercial geography, 4, first half of second year. Local industries, 4, second half of second year. Commercial law, 4, first half of fourth year. Civil Government, 4, second half of fourth year. Economics, 4, fourth year.

Mathematics: Algebra, 4, during first year; review, 4, three months in fourth year. Plane geometry (elective), 4, third year. Commercial arithmetic, 4, second half second year. Solid geometry and trigonometry (elective).

Business Technique: Penmanship, 4, first half first year. Business forms and practices, 4, second half first year. Book-keeping, 4, second year. Advanced Book-keeping (elective in third and fourth years), 4, third year; 6, fourth year. Typewriting, either one period, third and fourth years, or in the advanced book-keeping and stenography courses. Stenography (elective), 5, second year; 4, third year; 6, fourth year.

Science: Elementary physics, 4, first half first year. Physical geography, 4, second half first year. Chemistry, 5, third year. Advanced applied chemistry (elective) 5, fourth year.

Drawing (elective): Freehand, 3, third year. Mechanical drawing, 3, fourth year. Commercial Design, 3, fourth year.

CO-OPERATION WITH BUSINESS MEN

A noteworthy feature of this school is a scheme of co-operation maintained between the school and the business men of the city:

1. A general committee of twenty-five business men, representing the various activities of the city, has been appointed by the school board for advisory purposes. While this is the first time such a plan has been put in operation in the United States, it has been in operation for many years in Germany and is regarded as being a most important factor in the efficiency of her commercial schools. In Germany the City Chamber of Commerce usually takes the initiative in the establishment of the Commercial School, and it is to the business men that the boards of management look for advice in its administration. At this school throughout the year business men discuss before the students such subjects as success in business, business ethics, business organization, etc. Lectures have also been provided for on leather, wool, provisions, textiles, wholesale and retail business, etc.

2. Co-operation has also been provided for between the school and the business office. During each year groups of students have been taken into the business houses, where, under the direction of competent guides, they are shown a modern business house in actual operation.

Plan.

The plan of summer employment is put into operation in a very simple way. I have before me a circular letter addressed by the Principal of the school to a number of business houses asking for co-operation. The letter states that the school desires 300 positions for summer employment, at a minimum wage of \$2.00 a week, this sum being required to pay car-fares and buy lunches. While higher pay may be offered, wages are a minor consideration, the chief object being to give the boys some business experience. This scheme is regarded as an experiment but so far it has been successful. Subject to the parents' approval every boy of the second and third year classes is expected to spend at least four weeks of his summer vacation as an employee in a business house. To secure a position he must be mature enough for the work, have had a satisfactory school record, and be recommended by his teacher. He takes with him to the business house a summary of his school record, and brings back to the school a summary of his record with the business house, under the following heads: responsibility, initiative, accuracy, ability to work with others, good taste in dress and manners.

Travelling
Scholarships.

Last summer, through the public spirit of certain business men of Boston, two travelling scholarships were established. Such scholarships, I may add, are provided in Germany also. The young men who held these scholarships were selected from the senior class of the school after an examination in modern languages, economics, and a knowledge of commercial conditions in South America, and were sent on a trip of observation to the east coast of that continent, where they visited some of the largest cities, such as Buenos Ayres, Montevideo, Rio de Janeiro. On their return they made an official report of their visit to the Advisory Committee of business men associated with the school.

VI. CORRESPONDENCE-STUDY SCHOOLS

THE UNIVERSITY OF WISCONSIN, MADISON

GENERAL

When in Milwaukee in December, 1909, at the Convention of the Association for the Promotion of Industrial Education, I met some members of the staff of the University of Wisconsin. One of these was Mr. William H. Lighty, Secretary of the University Extension Division. Then, and later by correspondence, he put me in possession of some facts in connection with this division of the University work that should prove suggestive in Ontario. I heard also an illuminating address by Charles Van Hise, President of the University, on the subject of University Aid to Industrial Education.

The University of Wisconsin is a State-supported institution, its main revenue being derived from a two-seventh (2-7) mill tax. In addition to this, however, in recent years appropriations have been made for building and other purposes. The annual appropriation made by the State Legislature, including the tax and special appropriations, amounts to \$1,200,000. Each college of the University has its special staff.

UNIVERSITY EXTENSION DIVISION

The University Extension Division is one of the co-ordinate colleges. It consists of four departments: Four Departments.

1. *Lecture Instruction Department.* University lectures are available for lecture courses or single lectures, commencement addresses, etc., in a large number of departments. 1. Lecture.

2. *Debating and Public Discussion Department.* This department issues bulletins, stating questions of live interest, gives affirmative and negative references upon them and lends libraries for preparing debates. Thousands throughout the State in High Schools, School Boards, Town Councils; and farmers', social and women's clubs, etc., have been assisted through this department. 2. Debating.

3. *General Information and Welfare Department.* This department serves as the clearing-house for enquiries and for informal dissemination of useful and serviceable knowledge having a direct bearing upon general welfare. 3. General Information.

4. *The Correspondence-study Department* is the one in which we are interested. The instruction in it is given in five main divisions as follows:— 4. Correspondence-study.

- (1) Special Vocational Studies;
- (2) Elementary School Branches;
- (3) High School and Preparatory subjects;
- (4) Special Advance Work;
- (5) Regular University grade of work.

In the foregoing, thirty-five departments of the University are represented. These embrace 206 courses of study, the subjects taken by the correspondence students including nearly all that are offered.

As illustrations of the scope of the work done, I give the details of three of the grouped vocational studies:— Illustrations of Courses.

Mechanical Engineering: Mechanical Drafting, Stationary Engineering, Machine Design, Refrigeration, Heating and Ventilation, Power Plants, Gas Power Plants, Steam Engine and Boiler Operation. *

Structural Engineering: Structural Designing, Structural Drafting, Bridge Construction, Building Construction, Masonry and Reinforced Concrete.

Electrical Engineering: Lighting and Wiring, Car Operation, Electric Railways, Telephony, Central Station Operation, Dynamo Running, Power Transmission.

Fees.

A large percentage of students taking mechanical courses pay fees through orders on their employers, in small monthly instalments, many at the rate of \$2.00 a month and some at less.

*Correspondence-Study Department***Sources of attendance.**

The students in the Correspondence Courses come from the ranks of labourers, apprentices, farmers, skilled mechanics, labour organizations, clerks, salesmen, travelling men, stenographers, druggists, bankers, business men, home workers, club women, students, teachers, lawyers, clergymen, doctors, civic officials.

Qualifications of Staff.

Some of the members of the University Extension Division are appointed for correspondence-study work alone and devote their entire time to it. Others divide their time between Correspondence and residence instruction. Others again give most of their time to residence and the rest to correspondence instruction. The professors and instructors appointed for any course in correspondence read the recitation papers and give the instruction in these courses. Those who carry on the work in industrial education subjects, have by their previous training and experience special qualifications, not only for teaching these subjects, but even for the production of suitable texts.

Local Classes.

In addition to the instruction given through correspondence, professors and instructors from the University make visits to communities in which a group of students are working along the same line and there supplement the correspondence instruction with class-room lectures and individual instruction. In communities where local centres have been developed, the University has provided a staff consisting of a local representative or manager, usually of professorial rank, and instructors in such branches as have a sufficient number of students to warrant special local instructors, and field organizers to present the character of the University extension work to those who may profit by this form of instruction. These local classes meet in the local University head-quarters, in rooms belonging to school boards or public libraries, or in specially appointed class-rooms in a commercial or industrial establishment set apart and equipped by that establishment for University Extension teaching purposes. In one instance the owner of large business interests has supplied well furnished class-rooms and has equipped them with books for the students' use. He has also offered to pay the fees of all employees who complete courses of study.

It is significant of the success of the scheme that of the total number who began work only about 4 per cent. dropped out before completing the course, and those who did so had good and satisfactory reasons. One of the well-known defects of the commercial correspondence schools, such as that of Scranton, has been that so many students drop out. This defect President Van Hise realized shortly after the establishment of his University Correspondence School. I quote his words:

Success of
Plan.

President's
views.

The extension movement at the University has developed beyond our most sanguine expectations; indeed has expanded day by day, and I see before it almost limitless opportunity. Correspondence work at the outset followed the model of the commercial correspondence school, but Director L. E. Reber soon saw that there were two defects in that system—the defect that each student was obliged to work by himself, and the defect that he did not come in contact with his teacher. These two handicaps are so great that only a small percentage of those who begin a course of instruction continue to the end. It requires a great deal of stamina for a man, after he has worked nine or ten hours in a shop, to sit down by himself in the evening, study a lesson, and write a paper; and thus a very large percentage of students in correspondence-study courses have in the past fallen out before the end is reached. To remedy these defects it was suggested that the artisans should be gathered into classes, and meet a teacher. Hence, we have instituted the travelling professor.

Remedy for
Defects.

The Travel-
ling Professor.

But in order to make this more successful, it was necessary to get the co-operation of the merchants and manufacturers. Therefore we came into Milwaukee and presented the case to the merchants and manufacturers of this city. Some of them said, we will give you an opportunity to meet the men in our shops; a number of them offered quarters for class-rooms; and some of them went so far as to say, we will pay the men for the time they are receiving class-room instruction. In Milwaukee at the present time we have more than 1,000 students doing vocational work in twenty different manufactories. Thus, the defects of correspondence work have been remedied, and instead of some ninety-five per cent. dropping out of a course before its completion, less than five per cent. do so. Already we are told by the merchants and manufacturers of Milwaukee that the effects of this movement is seen in the increased efficiency of their workmen; that it furnishes them better-trained foremen, and in greater numbers.

Although this department of the University has been in existence only since January, 1907, the registration had grown from 26 on that date to over 3,500. Of the latter number, nearly 2,000 are registered for special vocational studies.

Progress of
Division.

President Van Hise's statement of the attitude of his University on the question of the extension movement for industrial education is well worth quoting; it is that of a State University which recognizes to the full its obligations to the people who support it:—

Attitude of
the Uni-
versity.

It is the desire of the University to fill the gap in the training of artisans—to do the work of the trade school until the trade school occupies the field; and when they do so fully, to take the artisans from these schools and make of them broader and better citizens; to give them an opportunity commensurate with their ability, such as every citizen should enjoy in a

democratic community, in a civilization where we do not recognize that one man is superior to another, and where we hold that the door of opportunity shall be open to all.

Other Uni-
versity
Correspond-
ence-study
schemes.

Nor is the University of Wisconsin the only University which has adopted an extension scheme. Within the past few years a number of other State Universities have followed the example of Wisconsin; notably, the Universities of Chicago, Kansas, Nebraska, and Minnesota; and half a dozen others have introduced correspondence-study instruction on a similar basis, although, of course, they have not yet carried it so far.



THE TECHNICAL DEPARTMENT OF THE SAULT STE. MARIE HIGH SCHOOL
The Pioneer Co-operative Industrial School of Ontario

ONTARIO

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ONTARIO

INTRODUCTION

In order to make clear the provision for industrial and technical education in each of the countries I visited, I have introduced the subject with an outline of the general organization of its educational system, indicating its most noteworthy features. In order now to make clear the changes that appear to me to be needed in the Ontario system, I give, first, an outline of its general organization, indicating the main obstacles from the point of view of the schools themselves, to its complete modernization; and, secondly, a statement, in some detail, of what we have already accomplished in the way of industrial and technical, drawing and art, agricultural, and commercial education. In connection with the latter statement I discuss the nature and practicability of proposed changes.

ORGANIZATION OF THE EDUCATIONAL SYSTEM

First, then, as to the organization of the system:

Like most other countries, we have three divisions—primary, secondary and university.

I. Primary education is provided for in our Public and Separate Schools wholly at the public expense. Besides the so-called essentials, English, mathematics, geography, and history, the courses of study include drawing and art, constructive work, manual training, and household science; and provision is made for instruction in commercial subjects, agriculture, and industrial arts. Primary.

II. Secondary education is provided for in our Continuation Schools, High Schools, and Collegiate Institutes, largely at the public expense. In these schools there are two classes of courses: Secondary.

1. The General Course taken by those who desire merely a general education; and

2. The Special Courses, as follows, taken up by those who desire education for special purposes.

(1) The courses for University Matriculation and the Preliminary Examinations of the Learned Professions. The latter lead to vocational courses; the former may lead directly or indirectly to such courses, but they are usually taken to enable the student to obtain a higher general education.

NOTE.—Only occasionally throughout the sections dealing with Ontario do I refer explicitly to the contents of the preceding sections. By means of the table of contents and the marginal notes, those who wish to study the subject may easily find any desired detail.

(2) The courses for admission to the Normal and Model Schools and the Faculties of Education. Although sometimes taken by those who desire only a general education, these usually lead to vocational courses.

(3) The Household Science course.

(4) The Commercial course

(5) The Agricultural course.

Courses (4) and (5) are themselves manifestly vocational; and, as course (3) prepares girls for housekeeping, it also is to be placed in the same class.

(6) The Manual Training Course.

(7) The Middle School Art course, which is an extension of the Art course of the first two years of the High School course.

The two foregoing courses, with a few exceptions, must at present be classed as cultural.

University.

III. Higher education is provided for also largely at the public expense at the University of Toronto, in the Faculties of Arts, Medicine, Applied Science and Engineering, Household Science, Education, and Forestry. With the University of Toronto are connected the federated universities of Victoria and Trinity, three federal denominational colleges, eight colleges directly affiliated, and five affiliated through the federated universities. The colleges provide for instruction in agriculture, dentistry, pharmacy, music, and veterinary science. The other colleges are merely secondary schools.

Outside of the provincial system there are four universities and a number of private schools.

OBSTACLES TO COMPLETE MODERNIZATION

Secondly, as to the main obstacles, from the point of view of the schools themselves, to complete modernization:

Uniform
Departmental
examinations.

The most striking feature of our primary and secondary schools is the system of uniform departmental examinations, which for over a quarter of a century have not only determined the character of the teaching, but have held in thrall the pupils, the teachers, and the public. In the case of the public and separate schools it is the examination for entrance into the high schools that dominates; and in the case of the high schools, continuation schools, and collegiate institutes, it is the examination for university matriculation and for admission to the teachers' training schools. On the results of these examinations school boards and the general public appraise the teacher's competency, and upon such appraisal depend his promotion and his salary. When to the influence of these examinations there are added that of academic tradition,

Other
influences.

the general desire for an occupation that allows "clean hands and good clothes," and the lack of suitable provision for agricultural and industrial education and of sufficient inducement to follow these occupations, it is easy to understand why for many years the most important products of our schools have been teachers and professional men. Our schools, it is true, also send out in increasing numbers clerks, book-keepers, stenographers, and typewriters; for the preparatory courses entail little cost upon school boards, and they are taken by many because they are short and lead to ready employment, and they, too, allow "clean hands and good clothes." But, as a determining factor in our school system, the influence of these courses is not to be compared with that of our uniform examinations. Apart altogether from the question of securing proper consideration for industrial and agricultural education, the evil influences of these examinations must be overcome. During the last few years something has been done to effect this purpose, but much still remains.

Chief products of the schools.

In any system of education one of the greatest obstacles to progress is the difficulty of securing regular and adequate attendance. That we have not been successful in doing so in Ontario is clear from the following statement, based on the latest statistics:

Irregular and inadequate attendance.

As to the Primary Schools: Out of an estimated total population in the Province of 2,687,861, there were enrolled in the Public Schools 401,268, with an average daily attendance of 240,008—that is, 59.81 per cent. of the enrollment; and in the Separate Schools, 55,034, with an average daily attendance of 34,553—that is, 62.78 per cent. Of these 239,331 (125,210 boys and 114,121 girls) were enrolled in rural and 216,971 (109,666 boys and 107,305 girls) in urban schools. Of the foregoing, it is estimated, about 1,070 girls and 1,030 boys in rural and 970 girls and 930 boys in urban localities—a total of 4,000—leave school from the third form; and about 9,190 boys and 8,810 girls in rural and 10,750 boys and 10,250 girls in urban localities—a total of 39,000—from the fourth form. Accordingly, so far as attendance at our provincial schools is concerned, a grand total of about 43,000 end their education in the third and fourth forms; those from the third form leaving generally at from ten to twelve years of age and those from the fourth at from thirteen to fifteen.

Statistics of school attendance. Primary Schools.

As to the Secondary Schools: The following table shows the latest returns of the attendance at the Lower, Middle, and Upper Schools of the High Schools, Collegiate Institutes, and Continuation Schools, the course for each school being a two years' one:

Secondary Schools.

Lower School. Middle School. Upper School. Total.

| | | | | |
|---------------------------------|--------|-------|-------|--------|
| High Schools | 9,938 | 4,672 | 1,142 | 15,752 |
| Collegiate Institutes | 10,706 | 5,011 | 1,632 | 17,349 |
| Continuation Schools | 3,955 | 1,884 | 27 | 5,866 |

Accordingly, in the Secondary Schools, 13,032 fewer attend the Middle School than the Lower School, and 8,766 fewer the Upper School than the Middle School; and, of a total of 456,302 enrolled in our Public and Separate Schools, only 2,801 reach our highest classes.

The foregoing estimate of attendance does not take into account the small number that attend the private schools.

Causes of
irregular
attendance.

Truancy Act
not enforced.

Early exodus
of pupils
destined for
the Industries.

General
causes.

Special causes

The general situation, as disclosed by the above statement, is a serious one. So far as concerns the primary schools, the situation is largely due to the neglect of the existing provisions. Until the child is fourteen, or until he has passed the high school entrance examination, he is required by the Truancy Act, with one or two necessary exceptions, to remain under instruction at a provincial school or elsewhere. But, although the Act makes it imperative for every urban municipality, and gives every township the power, to appoint a truant officer, in the case of the former it is sometimes either loosely enforced or not enforced at all; and in the case of the latter no such officer has yet been appointed. The phase of the subject, however, with which I am at present concerned is the large number leaving the provincial schools about fourteen or earlier, and the comparatively small number remaining for longer periods, whose destination in both cases is some form of industrial occupation. In this connection it is important to determine the causes of the exodus:

The Factory Act provides, with a few exceptions, that no child shall work in a factory until he is fourteen years of age; and, as I have already shown, the Truancy Act also provides, with a few exceptions, that every child shall remain under instruction at a provincial school or elsewhere until he is fourteen or has passed the High School entrance examination. Those, accordingly, whose circumstances compel them to earn money or to assist their parents as soon as possible, leave school at fourteen, some having completed the course of the first four forms of the Public School, while others drop out earlier. It is their age, not their school standing, that enables them to leave. Moreover, as attendance after fourteen is not compulsory, many boys and girls leave at that age, although not compelled to do so by financial necessity. The chief causes are parental indifference and lack of control, the irksomeness of study and of the restrictions of the elementary school, and the desire on the part of many to engage, as soon as possible, in some sort of money-making employment, no matter how small the pay.

The causes outlined above operate more or less in every country, but in Ontario other causes operate as well.

Owing to the conditions which have dwarfed the growth of the fifth forms of the Public Schools the High School Entrance Examination, usually passed when the candidate is about thirteen or fourteen, has come to be regarded as the Public School Graduation Examination. Some pupils, it is true, who pass do remain at the Primary school after they are fourteen or they enter the High School, and later take up a trade, but the evidence of manufacturers and school inspectors goes to show that their number is small indeed. Moreover, if under existing circumstances the child enters a High



CHEMISTRY AND MINING BUILDING
Faculty of Applied Science, University of Toronto

School, the predominant influences there are towards the professions, teaching, and commercial life. For the pupil who is going to take up some industrial occupation our school system provides no course which he or his parents recognize as bearing adequately on his future. He is without incentive to continue at school.

I. INDUSTRIAL AND TECHNICAL EDUCATION

1. PRESENT PROVISION—PROVINCIAL

Of technical education, in the limited sense of the term, we have none in our Public or High Schools, nor have we industrial education in the sense of preparation for the trades, except, as will be seen later, in the Toronto and Hamilton Technical Schools, and, to a very limited extent, in a few of the other High Schools. As now used in Ontario, the name technical education has included the manual training and the household science of Forms IV. and V. of the Public Schools, and of the High School Lower Schools; and as these subjects are preparatory in any system of industrial education, I deal first with the provision so far made for them.

(I) HOUSEHOLD SCIENCE

The subject of household science was first introduced into this Province in 1900 through Mrs. Lillian Massey-Treble, of Toronto, and the late Mrs. Hoodless, of Hamilton. Through the generosity of the former, the Victor School of Household Science and Art was established and maintained in Toronto; and through the untiring zeal of the latter, the Hamilton Board of Education and the Department of Education established and maintained the Ontario Normal School of Domestic Science and Art, which was transferred later to the Macdonald Institute, Guelph. As a result, the subject was placed in the revised school programmes of 1904, and it is now taken up with a more or less limited course in the following localities, the figures in brackets indicating the number of centres :

Public Schools Only: Brockville (1), North Bay (1), Ottawa (1), Toronto (13).

High Schools and Collegiate Institutes Only: London (1), Stamford (1).

Public and High Schools and Collegiate Institutes: Belleville (1), Brantford (1), Galt (1), Guelph (3), Hamilton (5), Ingersoll (1), Kingston (1), Peterborough (2), Sault Ste. Marie (1), Thorold (1), Woodstock (1).

Public and Separate Schools and Collegiate Institutes: Berlin (1), Owen Sound (1), Stratford (1).

Temporarily Closed: Renfrew (1).

That, is, after ten years' time, household science is taken up in only 21 of our 279 urban municipalities and in one of our townships

| | |
|--|---|
| Limitation of subject. | —by no means a satisfactory showing, especially in view of the liberal grants offered by the Department of Education. |
| Accommodations and equipment. | As I have already stated, the household science in our schools has so far no industrial outlook. Like the manual training, it is taken in addition to the courses in other departments; it is now simply one of the cultural and practical subjects of our curriculum. Each of the school centres is provided with a school kitchen and, in some cases, with a dining-room, having the necessary closets and other accommodation. In some of the centres the provision is excellent. Primary and secondary schools, however, in which the whole science of housekeeping and home-making is taught, we have not yet succeeded in establishing. In a few cases sewing is now being introduced, but the majority of the schools teach cookery alone. |
| Qualifications of teachers. | In the department of household science there is no difficulty in obtaining an adequate supply of teachers. Every teacher of the subject is fully certificated by the Department of Education, having been trained at the Macdonald Institute, Guelph, the Ontario School of Domestic Science, or the Lillian Massey School. In one or two cases, however, credit has been given for work done in the United States. In the Toronto and Hamilton Technical Schools, where the courses include dressmaking and millinery, these subjects are taught by women trained in the workshops. Household Science also receives attention at the Normal Schools and the Faculties of Education. |
| University Faculty of Household Science. | Here I may report that during the last ten years household science has reached a higher plane than manual training. The Victor School of Household Science and Art has developed into one of the arts graduation departments of the University of Toronto, and through the munificence of Mrs. Lillian Massey-Treble the Faculty of Household Science will occupy a building, now in course of erection on the University grounds, which has so far cost \$425,000, without equipment. |
| (2) MANUAL TRAINING | |
| Introduction of subject. | In 1900 Sir William C. Macdonald, a well-known Montreal philanthropist, established and maintained for three years manual training centres at Brockville, Ottawa, and Toronto. As a result of the success of his experiment, the Department of Education in 1904 placed Manual Training in the revised school programmes. In its elementary form in Forms I to III of the Public Schools, it is now called "constructive work." Since then the subject has been taken up in a considerable number of schools; but, as its value is not yet fully appreciated, and as like household science it is optional, it has not yet been generally intro- |
| Value not appreciated. | |

duced. The unthinking still class it amongst the educational "fads" and "frills," and it is looked upon with disfavour by some of our labour organizations, because a few years ago, in the United States, some who had received advanced training in the subject foolishly allowed themselves to be used in breaking up a strike. Manual training is now taught in the following localities, the figures in brackets indicating the number of local centres: Present provision.

Public Schools Only: Brockville (1), Cornwall (1), Guelph (3), London (4), North Bay (1), Ottawa (14), Rittenhouse (1), Toronto (13).

Collegiate Institutes Only: Kingston (1).

Public and High Schools and Collegiate Institutes: Brantford (2), Galt (1), Hamilton (4), Ingersoll (1), Peterborough (2), Port Arthur (1), Sault Ste. Marie (1), Stratford (1), Woodstock (1).

Public and Separate Schools and Collegiates: Berlin (1), Collingwood (1), Owen Sound (1), St. Thomas (1), Stratford (1).

Temporarily Closed: Alvinston (1), Essex (1), Renfrew (1).

That is, after ten years' time, notwithstanding the liberal grants offered by the Department, manual training is taken up in only 26 of our 279 urban municipalities and in one township. Manifestly, in the case of both household science and manual training, steps must be taken to secure their more general introduction.

In the Normal Schools the subject receives its due share of attention, and, since 1908, teachers-in-training who pass their examination at Easter may attend free a special course at the Macdonald Institute at Guelph, from then till the end of June, their board and travelling expenses being paid by the Department of Education. The object of this course is to train teachers who, in the urban schools, shall be able to give such instruction in drawing and woodwork as may lay a proper foundation for real industrial training. Seventy-eight teachers have obtained certificates of competency; but, owing to the recency of the provision, the lack of public interest, and, no doubt, the pressure of the high school entrance examination, little appreciable effect has so far been produced. A year's course of training is also provided at Guelph, but so far few have availed themselves of the opportunity. Provision for training teachers.

When first introduced as a school subject manual training was generally regarded as having only a cultural value. Now in Ontario, as in other countries, an effort is being made to give it an industrial outlook in the secondary schools and the higher forms of the public schools. That this modification in no way impairs its cultural value, both psychology and experience have shown. In the manual training centres at Alvinston, Brockville, Collingwood, Cornwall, Essex, Fort William, Galt, Guelph, Ingersoll, London, North Bay, Ottawa, Peterborough, Renfrew, the Rittenhouse School, and St. Thomas, the equipment is for woodwork alone, except in Galt, Guelph and Ottawa, where elementary work is Value of subject.
Woodworking centres.

| | |
|------------------------------------|--|
| Equipment | done in copper and brass also. At each centre the equipment for woodwork consists of from twenty to twenty-five single benches and the necessary tools for bench work in wood; and attention is |
| Allotment of time. | paid to mechanical drawing. On an average not more than an hour and a half a week is given to bench work, and not more than half an hour a week to mechanical drawing; but, considering the comparatively small amount of time available for the subjects, fairly satisfactory results are being obtained. |
| Centres for wood and iron working. | The centres which have gone beyond the simple equipment described above are Berlin, Brantford, Hamilton, Kingston, Owen Sound, Sault Ste. Marie, Stratford, and Woodstock. |
| Equipment. | In these secondary school centres the equipment is good, consisting of the usual manual training outfit, with, in addition, wood-working and metal-working lathes, forges, shapers, grindstones, vises, drills, circular and band saws, and other suitable tools. The equipment at Woodstock is probably the most complete. The equipment at the Sault was carefully selected by the Algoma Iron Works, with a view to the requirements of the local industries. |
| Accommodations. | Separate buildings have been provided at Brantford, Hamilton, Stratford, and Woodstock, and separate wings at Berlin, Kingston, and Sault Ste. Marie. In all these localities separate rooms are generally provided for wood-working (including wood-turning) and metal working (including forging, bench vise work, and machine shop practice). The work taken up at Stratford, Woodstock, and Berlin is simply manual training. There is at present a small industrial class at Brantford, and mechanical drawing has been emphasized at Kingston and wood-turning at Stratford. In nearly every case the work in drawing and in wood and iron is simply added to the work in other departments, and the academic work is that of the general course, without correlation with the practical work of the industries. |
| Character of the work. | |
| Destination of pupils. | In Kingston, the late Principal reports that practically all the few pupils who took the industrial drawing course enter a school of practical science, or the Kingston Locomotive Works as draftsmen. In Stratford, some of the boys work in the Grand Trunk Railway shops during the holidays; and in Brantford, the Waterous Engine Works Company gives the pupils a preference in admission to the drafting room. In the other schools, with extremely few exceptions, all of those who take the courses are intended for other than industrial occupations; they give up the manual training courses after one year or at most two. |
| Connection with the industries. | Nowhere, except at the Sault, has a connection been established with the local industries. In a letter to me of recent date, the principal states that an arrangement has been entered into for co-operation between the Algoma Iron Works and the Board of |

School Trustees. The general manager of the Lake Superior Corporation has agreed to allow his apprentices to take at the school not only drawing but English and mathematics, on condition that the school provide the necessary equipment. To this condition the board has agreed. This co-operative arrangement will necessitate a weekly afternoon's absence from the works; but, for this period, the corporation will continue the pay of the apprentices. The Algoma Iron Works is only one part of the industry at the Sault, and the principal expects that the apprentices in the other departments will ask for the same privilege. Evening classes, I may say, are also contemplated, and the outlook for an apprenticeship school is very bright.

Co-operation
at the Sault.

Nearly all the teachers of the schools I have so far dealt with have taken courses of various kinds in woodwork, metal work, and mechanical drawing, and many of them are continually improving their knowledge of these subjects by actual shop-practice. But the supply of teachers for manual training is unsatisfactory in both quality and number.

Qualifications
of teachers.

(3) TECHNICAL AND ART SCHOOL, HAMILTON

So far, the only locality that has made comprehensive provision for industrial education is the City of Hamilton. For this purpose, it has erected a "Technical and Art School," connected with and in the rear of the Collegiate Institute, at a cost, with equipment, of about \$100,000. The whole building is specially fitted up for industrial work. In the basement, which is high and well lighted, are located the forging department and the electrical laboratory; on the first floor are the woodwork shop, the machine shop, and class-rooms; and on the second floor, the household science department, the drafting room, the printing department, and class-rooms; while the whole of the third floor is devoted to the art department. The school was opened in September, 1909, and provides for both day and evening classes.

Accommoda-
tion and
equipment.

All of the members of the staff except two have had practical experience in industrial work and all possess special qualifications for their duties. The regular staff provide instruction in wood-working, machine shop practice, forging, electricity, mechanical drawing, freehand drawing, mathematics, cooking, and sewing. For the science and the English, no specially qualified teachers have yet been provided, and in this respect the industrial course is defective. This work is now taken up by members of the staff of the Collegiate Institute.

Qualifications
of staff.

For admission to the day school, pupils must be fourteen; but if they have not passed the High School Entrance examination,

Admission
tests.

it is sufficient if they satisfy the Inspector of Public Schools and the Principal of the Technical and Art School that they are fit for the work. During the session of 1909-1910, forty pupils were enrolled in the day classes, exclusive of special pupils in the household science and art departments.

Day courses.

The regular day classes are instructed in English, mathematics, science, woodworking, forging, machine shop practice, mechanical drawing, freehand drawing, and electricity. Special day courses are also offered in industrial designing, including wallpaper, book-covers, posters, jewellery, fabrics; and in china painting, clay modelling, cooking, and dressmaking.

A large number of pupils in the Collegiate Institute and the advanced classes of the public schools receive part time instruction in woodworking, metalworking, cookery, sewing, and freehand drawing.

Evening courses.

During the session of 1909-1910, the attendance at the evening classes ran from 150 to 170. The classes are open three evenings a week and provide instruction in mathematics, physics, chemistry, forging, experimental electricity, machine shop practice, woodworking, printing, mechanical drawing, architectural drawing, dressmaking, millinery, cookery, and a number of branches of fine and applied art.

Connection with local industries.

Visits are made to the local industries, and in connection with the work of the art department a local carpet company has agreed to pay for and make use of suitable designs for carpets; and a stationery manufacturing company has made a similar offer with reference to designs for blotters and book covers.

(4) TECHNICAL HIGH SCHOOL, TORONTO

Accommodations.

The building now occupied by the Toronto Technical High School was erected for a club house. As a consequence, the classrooms, halls, etc., are quite unsuitable for school purposes, and the continually increasing attendance has emphasized their defects. No shops have been provided for wood-working or metal-working, and the chemical and physical laboratories and the art rooms are both poor and poorly furnished. A site has, however, been provided at a cost of \$95,026, and a balance of \$211,020 is now available for a new building, from the City Council Grant and the proceeds of the sale of another site. At present the plans are under consideration, and, no doubt, in the course of a year or two Toronto will possess an industrial and technical school of a character suitable to the requirements of its population and to its importance as the metropolitan city of the Province.

Notwithstanding its present drawbacks the school has done good work, chiefly of a theoretical character. To the correctness of this statement some of the local manufacturers with whom I have communicated have borne testimony, as is shown in Appendix B.

The school now provides courses in the following departments: Courses.

Day Courses: Science matriculation, general scientific, business, art, home economics, and special courses connected with the preceding.

Evening Courses: Mathematics, applied mechanics, electricity, steam engineering, chemistry, architecture and building construction, mechanical drawing, freehand and design, modelling in clay, wood carving, estimating cost of building, cookery, home nursing, sewing, millinery, and embroidery.

Besides the principal the staff consists of 7 directors and 41 instructors. Of these 23 teach evening classes only; 6, full time in day classes; and the others, part time in both day and evening classes. A number of the teachers of the evening classes are engaged in industrial occupations during the day, and some of the teachers of the day classes have had practical experience of a similar character.

Number and qualifications of staff.

The Board has just decided to provide for the business department, a High School of Commerce in a separate building and under a separate staff.

(5) HIGH SCHOOL MINING DEPARTMENT, SUDBURY

Last September the Sudbury High School Board established a Department of Mining under a technically trained university graduate. The object is to assist in the development of the nickel and copper mines of the locality and their dependent smelters, the Moose Mountain Iron Mines with their magnetic concentration mill, the Long Lake Gold Mine with its cyanide plant, and the numerous gold and copper prospects along the Sault branch and near Lake Wahnapiatae.

Aim.

For a time this work will be developed in two divisions:

1. *Four Years' Courses* for High School pupils; and
2. *Short Courses* for men engaged in the mining industries.

The High School pupils will be required to take the English and mathematics of the first two years, together with physics, chemistry, geology, drafting, and commercial work, the languages being optional. During the last two years the course will consist of assaying, chemistry, geology, mining, drafting, physics, metallurgy, mining, surveying, etc., and the pupils will be entirely under the charge of the mining teacher. Practical work will be taken up during the summer vacations, and the mines and smelters of the district will be used in connection therewith.

School courses.

Those pupils who have completed the course satisfactorily and produced proof that they have had sufficient underground experience will be given a diploma.

Diploma.

At present twenty-three pupils are taking the High School Course, and the prospects of the success of this department are reported to be very favourable.

Courses for men.

The short courses for men engaged in the mining and smelting industries will be developed in three divisions: Prospectors', Miners' and Smelter men's classes, as follows:

Prospectors: The determination of the common rocks and minerals; geology, which will include the rocks and associations in which valuable minerals are likely to occur, and elementary knowledge of ore deposits, with particular reference to those of Ontario; the conditions which tend to make a deposit valuable; and other information which will be helpful in their calling.

Miners: Mining methods, timbering, the use and handling of explosives, and kindred matters.

Smelter men: Chemistry, the construction and use of various types of furnaces, the reasons for the various operations around the smelter, the reactions which take place in smelting, and the effect of the various materials used, etc.

Arrangements are also being made to have a prospectors' class during the winter season, when mining experts will give a series of lectures.

Accommodations and equipment.

There are three laboratories—Chemical, Physical, and Assaying. The Chemistry Laboratory is equipped for quantitative and qualitative analyses, as well as the usual High School work in Chemistry; the Physical Laboratory has also modern equipment, and the Assaying Laboratory is equipped with furnaces, gasoline tanks, and burners, and crushing apparatus; the total cost of the equipment being about \$5,000.

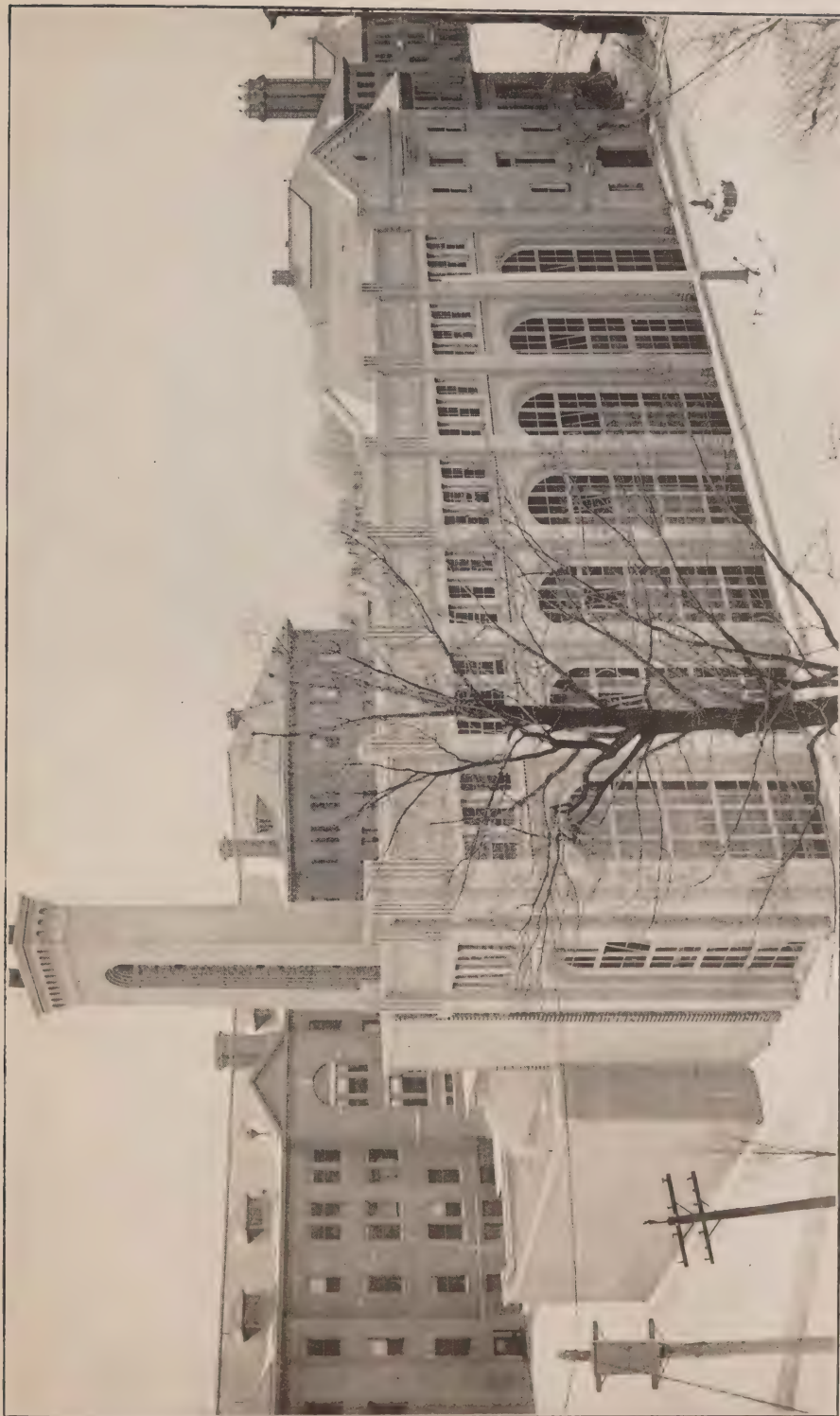
(6) EVENING CLASSES

Evening classes once existed at Kingston, but, owing to local conditions, they have been discontinued. After a year's interruption, Brantford has resumed its evening classes with a large attendance, in wood-work, metal-work, and mechanical drawing.

Besides the classes at Brantford, and those at Hamilton and Toronto, already described, classes of an industrial character are held at the following places:

Present provision.

At Toronto: The Broadview Boys' Institute, the Lansdowne School, the Dewson Street School, and the Queen Alexandra School; at Guelph: The Public Schools and the Consolidated School; at Brockville, Berlin and Galt, one class each; the class at Galt providing a course in the "Theory of Iron and Steel." Outside of Toronto and Hamilton, the only subjects taken up are



THE THERMODYNAMIC AND HYDRAULIC LABORATORIES

Faculty of Applied Science, University of Toronto. (Chemistry and Mining Building in the rear)

woodwork and metal work, household science, and mechanical drawing.

The evening class movement is still in its infancy. From a number of letters I have recently received I feel safe, however, in reporting that, with due financial assistance from the Legislature, we should soon have evening classes in most of the important manufacturing centres.

(7) FACULTY OF APPLIED SCIENCE AND ENGINEERING, UNIVERSITY OF TORONTO

But if Ontario has made little provision for industrial education it has made ample for technical education—for the education of those who are to hold directive positions in connection with industry—in the Faculty of Applied Science and Engineering of the University of Toronto, with its departments of instruction in civil engineering, mining engineering, mechanical engineering, architecture, analytical and applied chemistry, chemical engineering, and electrical engineering. These departments lead to the diploma of Bachelor of Applied Science. The instruction extends over four years and is intended to give the student a thorough knowledge of the scientific principles underlying the practice in the several professions and also such training as may make him immediately useful therein. The professional degrees are given after the B.A.Sc. has spent three years in the actual practice of his profession and has satisfied the examiners by oral and written examination that he has the necessary experience and competency.

The Faculty has well equipped laboratories, but is without the shops for woodwork and metal work, which are found in the technological schools of Great Britain and the United States; nor does it provide the courses for the industries that are maintained in many of these institutions. The system of instruction followed is the Prussian one, which even in more elementary stages provides the theoretical in the schools and the practical in the various industrial occupations. While taking these courses at the University, the students work during the summer in commercial machine and other workshops with the object of becoming acquainted with the conditions of industrial life, not with the object of acquiring skill in the use of tools. The graduates are intended to direct those who do the actual work of the industries, not to do the actual work themselves. The Faculty has a high reputation for efficiency, and its attendance is steadily increasing. In 1901, 32 diplomas and 20 degrees were granted; and in 1910, 162 diplomas and 97 degrees. Practically all the graduates remain in the professions, the exceptions being less than 1 per cent. Eighty-five per cent. of the graduates are practising in Canada; 65 per cent. in Ontario. An idea of

Prospects.

Various departments.

Diplomas.

Aim.

Degrees.

Equipment.

Character of the work.

Attendance, diplomas and degrees.

Distribution and employment of graduates.

the usefulness of the institution may be gathered from the following list of the employments in which the graduates are now engaged :

Exploration, surveys, railway construction, canals, waterworks, sewerage, drainage, irrigation, hydraulic power, municipal engineering, steel and concrete construction, bridge work, contracting, mining, metallurgy, assaying, prospecting, mine management, reduction plants, smelting, blast furnaces, steel works, field geology and mineralogy, machine construction, engine works, manufacturing, managers of machinery companies, salesmen in engineering industries, draftsmen, inspection patent office work, electrical designers, electric railway operation power stations, telephone and telegraph work, design and construction of electrical equipment, power transmission, architecture, building inspection, ventilation and heating, sanitation, analytical chemistry, industrial chemistry, managers and chemists of sugar pulp, soap, gas, tanning, packing, and other related industries.

2. PRESENT PROVISION—VOLUNTARY

So far I have dealt with the institutions which belong to the Provincial system of education. There are, however, others under outside control, which deserve notice partly on account of the importance of their work and partly on account of the organization of some of them.

(1) SCHOOL OF MINING, KINGSTON

| | |
|-----------------------|--|
| Status. | At Kingston, provision for technical education is made in the School of Mining, which is a branch of the School of Mining and Agriculture, incorporated by Act of our Legislature and affiliated with Queen's University for the purpose of receiving degrees. It is, however, a school of applied science, providing an education |
| Aim | both theoretical and practical, for the professions of the mining, civil, electrical, mechanical, chemical and sanitary engineer, the assayer, the consulting geologist, and the metallurgist; and for prospectors, mining foremen, and others concerned in mining. The |
| Diplomas and degrees. | school provides a three years' course for a diploma and a four years' one for degree of B.Sc., in the departments of mining and metallurgy, chemistry, mineralogy, chemical engineering, civil engineering, mechanical engineering, sanitary science, and power development. After due examination and at least two years' practice of the profession, the degree of M.Sc. is granted, and after three, the degree of D.Sc. The school is well provided with laboratories and with "shops" for woodworking and metal working. It receives an annual grant of \$42,000 from the Legislature of the Province, and has done good service, especially in the eastern part of the Province. |
| Equipment. | |
| Legislative support. | |
| Attendance. | For the last four years, the average number of graduates has been a total of 39, including 13 in Mining. These numbers, however, should be taken in relation to a freshmen class of about 90 for each of the four years. |

Sixty-two per cent. of the total number of graduates and 66 per cent. of the mining graduates are employed in Ontario. Their occupations are as follows, 64 per cent. of the total number being engaged in the first three occupations:

Distribution and employment of graduates.

Mining and prospecting, electrical engineering, municipal engineering, surveying, railway engineering, chemistry and assaying, geological survey, mechanical engineering, with 3 per cent. in various other occupations.

(2) APPRENTICESHIP SCHOOLS

The Grand Trunk Railway has established large shops in which it employs and trains apprentices at Toronto, Ottawa, Allandale, Montreal, and Stratford, Canada; and at Battle Creek and Portland, U.S.A.

Grand Trunk Railway.

As an example of a school provided by a large corporation in connection with its works, I visited the one at Stratford. The shops which have recently been completed are, it is claimed, the second largest on the continent and the only ones in which the apprenticeship system is fully worked out. The building itself and the surroundings are remarkably commodious and well kept, and, as the roof and the sides are made of glass, the interior is unusually well lighted. The departments of instruction are blacksmithing, machinery, erecting, forging, brass founding, boiler making, model and pattern making. Two evenings a week the apprentices meet for class work, under a practical man, who works in the shop during the day. There are six teachers, who take up practical mechanics and mechanical drawing, as well as arithmetic and mensuration. The classes run from November to April, when an examination is held. At present, 122 are in attendance, 107 apprentices and 15 "improvers." If the apprentices fail at any of the examinations, they are dismissed. In the shops a specially detailed foreman instructs the apprentices, pointing out their mistakes and showing them the proper methods. The master mechanic himself, who is an enthusiastic supporter of this method of training, takes a great interest in the work.

School at Stratford.

Accommodations.

Courses of study; staff; attendance.

The apprenticeship covers five years. A contract is signed between the company and the apprentice, and the wages paid increase as the course advances. For the first year the payment is 8c. an hour; for the second, 10c.; for the third, 12c.; for the fourth, 14c.; and for the fifth, 17c. The working hours are from 7 to 6, with an hour at noon.

Contract between Company and Apprentices.

The Grand Trunk Railway system has an arrangement with McGill University by which two scholarships are competed for each year by the apprentices, or the employees' sons. The winners are each entitled to a four years' course in mechanical engineering, transportation, or railway construction. During the long vacation,

Arrangement with McGill University.

the company finds them employment at fair wages. On the completion of his university course each apprentice is required to give the company two years' service at reasonable wages; and, if it does not find a satisfactory position for him at the expiration of this period, he is then free to look for one elsewhere.

In this apprenticeship system the Grand Trunk Railway has been a pioneer, and it has since been copied by all the great railways of Canada and the United States, as well as by some of the large manufacturing firms of the latter country.

Canadian
Pacific
Railway.

Character of
the provision.

One other great Canadian railway, the Canadian Pacific, has a school of the same character at the Angus Shops, Montreal. From correspondence, I learn that the apprentices receive instruction free two hours twice a week during working hours without deduction from their pay. This instruction is compulsory. Evening classes are also maintained, but they are optional and are intended chiefly for adult employees who cannot afford to pay for instruction outside. Scholarships and prizes are awarded in the different branches of study. Any material needed for the classes is free and, for those who attend the evening classes, supper is also free.

Michigan
Central
Railway.

The New York Central Railway, with which the Michigan Central is connected, has also provided at St. Thomas, Ontario, one of its apprenticeship schools. This railway has nine other such schools in the United States. From the documents I have at hand, the system appears to be a very complete one.

Dennis Wire
and Iron
Works Co.,
Curriculum.

In Canada, so far as I am aware, no large manufacturing centres have yet made similar provision, except in London, where the Dennis Wire and Iron Works Company last September established a class for its workmen in designing, geometry, mensuration, draughting, construction, reading blue prints, laying out work, etc. In the United States, however, ten manufacturing firms are reported as having such schools as an integral part of their business.

(3) CANADIAN HOROLOGICAL INSTITUTE

Accommoda-
tions and
equipment.

Courses.

Diplomas.

The only commercial trade school in the Province is the Canadian Horological Institute for the training of watchmakers. It occupies a building designed expressly for the work and owned by the director. The work room is well lighted and ventilated, and well equipped. The work of the school consists of lectures, technical drawing, and bench work, special stress being placed on the last two. The instruction is individual. No one without previous experience is admitted for less than two years. In the case of other students, the time required to complete the course varies according to the value of the previous experience. Diplomas are granted in the first and second grades, but only to those who complete the work of

the full course. When the student provides the lathe, the cost of instruction for the first year is \$180; when the school provides it, the cost is \$200. Similarly, the cost for the second year is \$150 and \$160. Provision is also made for short courses in the case of those who do not intend to complete the full course. The hours are from 8.30 to 12 and from 1.15 to 5.45. Students who do trade work receive half the profits. This school has been in existence for over twenty years. If it were in Germany or in Switzerland it would probably belong to the State system of industrial schools, and have the financial and other benefits of such connection.

(4) YOUNG MEN'S CHRISTIAN ASSOCIATION

In this Province, as in other countries, the Young Men's Christian Association is doing a very useful work by means of its evening classes. In Toronto, it has a Commercial School in which the usual commercial subjects are taken up. It provides also special classes in accountancy, salesmanship, show-card writing, public speaking, first aid to the injured, etc. Its present industrial provision consists of a trade school for carpentry, in which is taught the application of the steel square to the building of stairs, roofs, and various other building operations, and a trade school for jewellers in which are taught engraving, designing, setting, and the manufacture of jewellery. The Association has classes in other parts of the Province: Belleville, Brantford, Collingwood, Galt, London, Peterborough, Port Hope, St. Catharines, and Stratford. In these the most important vocational courses are the commercial subjects, mechanical drawing, shop arithmetic, and sign writing.

As reported to me, the policy of the Association is to co-operate with and supplement, not to compete with, the educational work of the Province. Its intention is to develop classes not provided for, or not sufficiently provided for, in some localities. As a corporation it thus undertakes to perform the same function as do philanthropists like Sir William Macdonald. With the large amount subscribed for its new buildings in Toronto during the past year, the Association expects to conduct in that city schools in plumbing, stone masonry, plastering, painting and decorating, the designing of garments, and the operation of power sewing machines.

3. THE SITUATION FROM THE POINT OF VIEW OF THE INDUSTRIES

Besides setting forth, as I have already done, the existing provisions for industrial and technical education, it is now desirable that I should set forth also the situation from the point of view of the

industries before attempting to suggest changes in the organization of our school system. The following statement summarizes the opinions communicated to me both orally and by correspondence:

Preparatory
education of
those entering
the trades.

1. Pupils from the schools entering the trades are poorly prepared. They lack the power of independent thinking and they are unable to apply to practical purposes the knowledge they have obtained. To quote from one of my correspondents: "The average apprentice gets along fairly well on a Public School education after he has found out in the shop how to apply it practically, which means that the shop has to do what the schools should do, to make a boy's education of practical value to him." The defect here pointed out is probably due as much to the immaturity of the pupils who enter the trades as to the lack of practicality in our courses of study.

Provision in
the schools.

2. In our educational system, to quote from the Report of the Technical Committee of the Manufacturers' Association, "very little effort is made to interest the pupil who, when a certain stage in his education is reached, fails to respond to the effort of the teacher. This pupil is not to be condemned at once as an idler. Very probably his awakening mind is attracted by mental food other than that offered him in the rigid curriculum of our present system. He may desire to work with his hands, and, through a different system, could be easily instructed in studies which would tend to guide those hands in their work. This pupil should not be turned out of the schools in a dissatisfied frame of mind. He should be retained until definite convictions have been reached as to what purposes he shall devote his life. Under our present educational system, many pupils are driven by the system itself, or by their parents, into commercial and professional life who would be much better suited for executive positions in our workshops. Too often parents do not realize the prizes that are available in industrial life, and only in recent years have our educational authorities awakened to the fact that the educational system, as at present devised, tends to take the youth of the country away from industrial life."

A good
general
education
indispensable.

3. The report of 1910 on Industrial education, published by the American Federation of Labour, in which Ontario is represented, makes the following pronouncement:

"Our movement in advocating Industrial Education protests most emphatically against the elimination from our Public School system of any line of learning now taught. Education, Technical or Industrial, must be supplementary to and in connection with our modern school system. That for which our movement stands tends to make better workers of our future citizens, better citizens of our future workers." This position is maintained also by employers of labour and by experienced educationists. To quote from the letter of a manufacturer: "What we want in our factories is apprentices

who by their previous education have been made both resourceful and strong." To quote again from the letter of an educationist: "The great hope of increased efficiency and of a higher standard amongst artisans depends upon his education before he enters the shop." As I have already pointed out, this opinion is strongly held by the Germans.

4. Owing to the decadence of the apprenticeship system, no organized means of training the workman now exists in connection with the trades and other industries. In many there are no apprentices, and where there are so-called apprentices, few employers of labour make any systematic attempt to provide for their training. In shops where there is little machinery, the workman generally picks up his trade as best he can, without any systematic direction by the foreman, or with the occasional aid of his fellow employees. In the industries which are highly specialized, the workman has no opportunity to learn more than one step in the process of manufacture. This he is able to learn in a short time, and his employer takes care he shall learn it well. If, however, he wishes to learn all the trade, he "steals it" by going from shop to shop and learning an additional step in each.

no Training during the apprenticeship period.

5. The number entering many of the industries is becoming smaller. Those who do enter are not willing to become apprentices or to spend the time needed to learn the trade. They expect journeymen's wages soon after they enter, and, for the sake of a small increase, they pass from one employer to another.

Inadequate supply of workmen and its results

6. From the point of view of the employer, the limitations placed by the Labour Unions upon the number of apprentices to each journeyman, both prevent the adoption of any organized system of training and unduly limit the supply. From the point of view of the organized labour, this limitation is necessary to prevent the employer from exploiting cheap labour for his own benefit.

7. In a country like Canada, with its abundant opportunities of advancement, the best workmen are continually dropping out of the ranks and so continually lessening the supply. They embark in business for themselves, or they migrate to the Western Provinces where they often enter upon other employment.

8. Employers in Ontario have great difficulty in procuring an adequate supply of competent foremen and managers and the higher grade of skilled workmen. "The result," to use the words of the Technical Committee, "is that many of the factory executives, as well as many of the higher paid artisans, are recruited from the industries of Great Britain and the United States."

9. To borrow the words of the report of the Massachusetts Commission, which apply equally to Ontario, the result of the present industrial situation as set forth above "ter is to increase the cost

Results of the present industrial situation.

of production, to limit the output in quantity, and to lower the grade of quality. Industries so recruited cannot long compete with similar industries recruited from men who have been technically trained. In the long run, industry, wherever in the world it is located, which combines with general intelligence the broadest technical knowledge and the highest technical skill, will command the markets of the world."

Remedy
proposed.

10. Both the manufacturers and the labour unions are strongly in favour of a system of Industrial and Technical Education, organized on modern lines, as the remedy for most of the evils set forth above. This is embodied in the resolutions passed by both, the chief of which I quote in Appendix A.

4. PROPOSED CHANGES IN PRESENT PROVISIONS FOR INDUSTRIAL AND TECHNICAL EDUCATION

INTRODUCTORY

Having completed my survey of the existing provision in Ontario for Industrial and Technical Education, and having pointed out incidentally its shortcomings, I now submit the changes that appear to me to be necessary if we are to provide as adequately for the industries as we have long been providing for the professions. Owing to the diversified nature of the industries and of the interests involved, and the general lack of knowledge of the conditions of the problem, I find it necessary to enter into greater details than in the case of either Agricultural or Commercial Education. Moreover, Industrial and Technical Education is the main subject before the public at present, and it is the main theme of this report.

Classes of
pupils.

Of those boys and girls for whom industrial or technical training should be provided, there are two main classes:

I. Those who are in attendance at our public, separate, and high schools and who will enter an industrial occupation; and

II. Those who are engaged by day in industrial occupations and need this training, no matter what may have been their previous educational opportunities.

Pupils in
attendance;
two sub-
classes.

Of those pupils who are in attendance, there are two sub-classes:

1. The first sub-class consists of the very large number who leave school, for various reasons, at or before 14; and

2. The second sub-class consists of the comparatively small number intended for industrial occupations who remain or may be induced to remain at school for various periods after 14.

The replies to my circulars to manufacturers of all classes show that even in the skilled trades the large majority of the boys who enter come from the Public Schools, and that, in the unskilled and

semi-skilled trades, the boys and girls come from the same source, some entering from Form III. and many from Form IV. but without having completed the work. A limited number pass the High School Entrance Examination, but very few indeed enter from the High Schools.

1. PRIMARY SCHOOL CLASSES FOR BOYS AND GIRLS LEAVING SCHOOL AT OR BEFORE 14

First, then, as to the training of boys who leave school at or before 14: Before this age, the boy is not ready for industrial training, but he can be taught to use his hands properly making things in which he is interested; he may be trained so that his hand and his brain may work together; he may learn the value of accuracy and the result of miscalculation; he may also learn that nothing but good handiwork will do and nothing but the best is good; he may be taught to express himself with his pencil as well as in language, and in particular to make and to work from simple plans; he may increase his power of invention by designing objects in wood or metal; and, under the influence of a competent teacher and suitable environment, he may even realize that some forms are more beautiful than others. And the knowledge and skill he acquires by the above processes he may turn into power in dealing with the handiwork of his future trade.

Courses for boys.

The foregoing, educationists will recognize as a description of what the Manual Training and Art Work and Drawing of our elementary schools should be. From the point of view of the necessities of the future workman, it is of the utmost importance that these subjects be given an industrial bent. And if, in addition, the other subjects of the public school course are brought into closer relation to the pupil's life than they have hitherto been, they will become the best and, indeed, the only possible preparation for industrial work before the age of 14.

Secondly, as to the training of girls who leave school at or before 14: For the girl who then leaves for some industrial occupation, the public school course to the end of the fourth form also needs to be modified. For the fourth form in particular, Manual Training should consist of Household Science and Art Work and Drawing, the last named dealing chiefly with suitable freehand and elementary designing, and the rest of the course, as in the case of the boy, being intimately related to the life of the pupil.

Courses for girls.

Regarded as educational "fads" when introduced about twenty years ago, Manual Training, Household Science, and Art Work and Drawing have come to be recognized in every progressive country as essential parts of any scheme of elementary education. Besides being basal in any such scheme, they have a cultural value

Value of Manual Training, Household Science and Art and Drawing.

which is necessary for the future professional man, as well as for the future workman and the future homemaker. As has already been pointed out, Art Work and Drawing are compulsory subjects of the Ontario Public School Course of Study. Manual Training and Household Science are also compulsory in the Public Schools into which they have been introduced. The time is manifestly approaching when it will be the duty of the Department of Education to place them also on the compulsory list of subjects in our urban schools, to begin with.

Aims of teachers in greater need of modification than courses of study.

I have spoken above of the necessity for modifying our courses of study. As a matter of fact, however, it is the teacher and the examination system that are to blame. Some changes, it is true, will be necessary; but, to secure the proper operation of these courses, the motive of most of our schools must be changed and the proper goal set before both the teacher and the pupil. To put matters right, our professional training schools can do much, but public opinion can do more. Moreover, we cannot emphasize too strongly the need of a good general education.

2. INDUSTRIAL AND TECHNICAL SCHOOLS FOR BOYS AND GIRLS AT SCHOOL AFTER 14

Boys and girls remaining at school after 14.

Next, as to the training of the important but, at present, comparatively small number of boys and girls who remain or may be induced to remain at school for various periods after 14. How to provide this training constitutes the chief educational problem of the day. With their compulsory attendance and their co-operative systems, Germany and Switzerland have made most advance. Great Britain and the United States are attempting a solution. In Ontario we are about to do so.

Classes of schools proposed.

As the result of my investigations and experience I have to report that, for this sub-class of boys and girls, three classes of day schools are feasible in Ontario:

- A. The General Industrial School.
- B. The Special Industrial School.
- C. The Technical High School and High School Department.

3. INDUSTRIAL AND TECHNICAL SCHOOLS FOR BOYS AT SCHOOL AFTER 14

A. The General Industrial School

Age of admission to industries.

As we have seen, industrial occupations that demand intelligent, individual effort do not want the boy until he is about 16. Before that age he is, as a rule, callow both physically and mentally. The unskilled industries, and even some skilled industries, will take him, but they will put him at work which has little or no value either cultural or practical and which seldom leads to a more productive future. For this sub-class I propose General Industrial

Schools, with a two years' course to be increased or diminished according to local conditions.

For such schools the curriculum should consist of shop work in wood and metal of a more or less general character, taking up about one-third of the time; with drawing, English, book-keeping, practical mathematics, and science, all intimately correlated with the shop work, and all being treated from the point of view of the workman and the industries of the locality. To this course should be added a general outline of English and Canadian History with special reference to the history of trade and commerce; as in European countries, suitable physical exercises to develop a symmetrical body; elementary civics and a course in English literature to broaden the mind and cultivate the finer emotions. The General Industrial School should be so organized as to provide a suitable foundation for whatever trade a boy might select. In them he would be fitted for life as a citizen; and, while acquiring industrial knowledge as well as skill in the use of tools, he would work with due economy of time, material, and effort; that is, his "industrial intelligence" would be adequately trained. Moreover, the two years spent in this preparatory school would develop in him a definite vocational purpose and would enable him, with the assistance of his teachers, to select the trade for which he is best fitted. In them, he would also be trained for a place in those establishments where there is specialization, where much machinery is used and each workman is assigned a part in a process of manufacture which may include a hundred parts. This type of day school, variously modified and known by various names, is common in Europe, and is gaining ground rapidly in the United States. It is, I believe, the solution of the day school industrial problem with which for some years and in many localities we must be content in Ontario. It is the kind of school that can be most easily introduced, for our manual training provision may be readily modified to suit the new conditions. Moreover, as it provides basic general training, from it, as opportunity offers, may be developed the special industrial school.

As to the admission age and educational standard: The pupil should enter the school as soon as he is physically and educationally able to go on with the work. Physically he should be able to handle profitably the lighter tools—that is, when, in most cases, he is about 13 or 14; and, educationally, he should have a fair knowledge of the essential public school subjects. Moreover, as so many leave school before completing the fourth form courses, it would be well, at first at any rate, to admit the pupil whenever, in the opinion of the principal of the primary school and the principal of the general industrial school, he is able to comply with

Curriculum.

Aims and character.

May be variously modified.

Why important.

Admission test; standard.

Importance
of a good
general
educat on.

the foregoing requirements. Gradually the standard of scholarship might be raised, but present conditions justify the above proposal. We are going to make the boy a workman, not necessarily a scholar; and a fair knowledge of the essentials should now suffice. Nor should it be forgotten that he will continue the most important academic subjects in the industrial school where they will be none the less cultural because they have an industrial application. If boys can be induced to take a High School course before entering an industrial school, so much the better. My investigations lead me to endorse most heartily the opinion, now held by employer and employee as well as by educationists, that the better the general education of the workman, the more efficient an industrial unit will he become. But, in the meantime, we must adapt our schemes to existing conditions.

Known by
various
names.

A word as to the name for this class of school: The commonest name by which, in other countries, the General Industrial School is known is the Continuation Industrial School. This name is properly applied where the school, whether a day or an evening one, is associated with the elementary school, and continues its programme in a limited form and with an industrial outlook. The name comes from Germany, where it answers fully the foregoing description. In England the same idea is carried out in the name Higher Elementary School and in France in the name Complimentary Courses. In the United States such schools are called Industrial Schools, Secondary Industrial Schools, Intermediate Industrial Schools, Continuation Schools, Shop Schools and Factory Schools, all names connoting their general character. The name Vocational Schools, also applied, is a manifest misnomer, for, in their present condition, it connotes too much. In some parts of the United States and England, I may add, such schools are also known as Preparatory Trade Schools. As I shall point out further on, the conditions in Ontario have become such that we cannot develop these schools satisfactorily as part of our Public School system; and, accordingly, I propose the name General Industrial Schools, which indicates the object of the school, without conveying a wrong impression as to its character and relation.

Reasons for
selecting
name.

B. The Special Industrial School

Reasons for
selecting
name.

For the next grade of school for boys, I propose the name Special Industrial. Ordinarily such schools are known as Trade Schools, and, usually, they are so in reality; but they may occasionally provide for occupations such, for example, as various forms of transportation, which are not generally included in the trades. Moreover, the name Trade Schools is objected to by many on the

ground that it supports the idea that they teach a trade completely. It is, however, with the trades that we are now chiefly concerned.

After the course in the general industrial school the boy should pass on to a special industrial school where the course is not general, but special; where the trades and similar occupations are taught with a view to making efficient workmen, and where the work is essentially individual and largely independent of machinery. Such a school, however, will not alone turn him out fully skilled. There he learns the theory and the processes of the trade. By applying this knowledge in the shop he becomes expert and develops speed. When about 16 the boy should receive in this school specialized instruction in the trades and other similar occupations, both practical and theoretical, with cognate subjects as well. Correlation with the local industries is especially to be desired. In the work of the school they afford a ready means of concrete illustration. Moreover, such instruction will commend itself to the supporters of the school, and to the parents in particular, who will look to the locality for employment for their children. The number of years to be devoted to such instruction will, of course, depend upon the character of the trade and the necessities of the pupils. Systematized instruction of the foregoing character is also needed, both for the workman who must know all his trade and for the workman who, owing to factory specialization, learns only part of it. The shop and the special industrial school together simply provide a new form of apprenticeship.

Aim and character.

A new form of apprenticeship.

In none of the countries I visited are the full-time day trade schools either numerous or well attended. The need for such schools is confined to a comparatively small number of trades and to localities where there is an exceptional concentration of industries. In other countries the trade schools have many varieties in their standards and the details of their courses. Those that seem to be most needed in Ontario and to give promise of most successful operation would be in connection with the machine and building trades, the printing trades, and furniture manufacture. But the cost of the accommodations, equipment, and maintenance, and above all, the financial necessities of the pupils and their desire to earn money as soon as possible have prevented the successful operation of such schools, even where they are suitably staffed and equipped. The latter obstacle some of the older countries of Europe have attempted to overcome by a system of scholarships and maintenance grants. Scholarships we may have in Ontario, but maintenance grants would not be acceptable to a democratic community. Even in countries where the full-time day trade schools have been long established, they are attended by dozens; the evening schools by hundreds. The day trade schools, it is true,

Limitation of number and attendance.

Special obstacles to successful operation.

will no doubt increase in numbers, as the belief in the necessity for industrial education increases and local obstacles are removed; but it is very unlikely that for many years this type of school can be maintained in Ontario except in the very largest centres. Moreover, the specialization in manufacture, which is continually increasing, will itself tend to limit their numbers.

Admission tests.

The admission qualifications to this class of school will, of course, depend upon whether the pupils enter from an elementary or a general industrial school. In the former case the qualifications will be the same as for admission to the general industrial school; and, in the latter, they will depend on the relation of the general to the specialized school.

Length and character of courses.

In dealing with the question of the general industrial school I have assumed a two years' basal course. Local conditions, however, might make it necessary for some of the pupils or for all to specialize from the beginning or shortly afterwards. Some of the vocational schools of the United States, which I have already described, are of the latter character, and their establishment is evidently contemplated in the resolution of the American Federation of Labour, quoted in Appendix A. If specialization were carried on from the first, we should then, of course, have a special industrial school of a lower grade than that contemplated in this section of my report. Probably the first stage in the development of a two years' basic industrial course in most centres of Ontario will be a school of this or of a mixed character. Until public opinion is properly educated most parents and boys will want definite preparation for a trade at an early stage. As a matter of theory early specialization is undesirable; but we cannot ignore the fact that, when they enter a trade, such specialization is forced upon those who do not or cannot attend an industrial school; we must deal with the situation as it exists.

Lower grade special Industrial Schools.

Co-operative part-time trade school.

A variant of this class of school must also be considered: In a few cities of the United States the part-time trade school on the co-operative plan has been carried on during the last few years, with apparently satisfactory results. For a certain number of hours a week the pupil of the school goes to the factory for practical work, and takes up in the school a special theoretical and academic course bearing upon his trade. The organization of this system I have discussed in my account of the Fitchburg and Beverley Schools, where a mutual arrangement has been made between the manufacturers and the school boards. In my discussion of the subject I have set forth in detail the advantages of the co-operative plan as they present themselves to the local authorities; also the views of organized labour on the subject of such co-operation. Besides the manufacturers of Fitchburg and Beverley, some

others, I find, hold that for certain industries this type of school is practicable, but that for others the instruction cannot be given by day. From this point of view, accordingly, the practicability of co-operation depends on the nature of the trade.

C. The Technical High School and High School Departments

Some boys may, however, take a technical high school course. ^{Aim.}

For such, separate schools may be provided or the courses may form a department of the high school, under competent direction. They would prepare for positions in industrial life which require special technical knowledge and are of greater importance and responsibility than those held by skilled mechanics. Those who would attend them would come from homes unembarrassed by financial considerations, whereas with those who would enter the industrial schools wage-earning at an early age would be a necessity. As will be seen by my description of the Springfield Technical High School, which is of this type, the curriculum provides for a two years' course taken by all, followed by elective two years' specialized courses, with, in both cases, direct applications of the principles of science and mathematics to practical work, such work having an industrial but not narrowly vocational character. Another type of technical high school prepares for more advanced professional work, and is, accordingly, intermediate between such a school as the Springfield one and the higher technological colleges. Of this character is the Stuyvesant High School. As I have already pointed out, none of the Ontario so-called Technical High School departments answers either description. With few exceptions, these departments consist simply of manual training added to the ordinary academic work of the school. None of them as yet is adequately organized.

Curricula.

Character of
Ontario
Technical
High School.

The technical high schools as we find them developed in a few large centres of population in the United States correspond *longo intervallo* to the technicums of Germany and Switzerland and the higher departments of the polytechnics of Great Britain, and there is reason to believe that in time many will become more and more assimilated to them in general character. Like some of the technicums, the American technical high school usually has another function—it prepares students for admission to the higher technological schools, some of which even now require such preparation on the part of their matriculants. The technical high school is a necessary function in a complete system of education; but for their products there would be little or no demand in Ontario for a good many years. The day when they would be in demand might be hastened if the standard of matriculation into the Faculty of Applied Science and Engineering in the University of Toronto were raised very con-

Character of
American
Technical
High School.

Prospect in
Ontario.

siderably, as has been done in many other similar institutions, and the character of its matriculation course brought into closer relation to its undergraduate courses and the capabilities of our high schools.

(4) INDUSTRIAL AND TECHNICAL SCHOOLS FOR GIRLS AT SCHOOL AFTER 14

Age of admission to trades and character of courses.

So far I have dealt with the question of provision in day schools which is more or less feasible in the case of boys. Girls, on the other hand, who enter any kind of industrial employment do so earlier than the boys who are to become skilled mechanics, and the courses that result in wage-earning capacity are by them more easily completed than are the corresponding courses for boys. In the large majority of English and American trade schools girls enter at the age of 14, and sometimes even earlier. They desire to earn money as soon as possible, and, for obvious reasons, they do not look forward to a trade or any other industrial occupation as their life work. These facts, I find, are generally recognized in providing for industrial training. The Trade Schools Act of Wisconsin, for example, provides "for the maintenance of schools for the purpose of giving practical instruction in the useful trades to young men having attained the age of 16 years and young women having attained the age of 14 years." Accordingly, for girls of about 14 who are intended for some kind of industrial occupation, and who may remain or may be induced to remain, for various periods after that age we must, in the large majority of cases, provide an industrial course specialized from the beginning, although, as is done in the trade schools of Europe and America, provision should be made for further instruction in the essential academic subjects as well. In some localities the conditions might justify the establishment of a general industrial school with a one or two years' course before specialization. Such general courses might consist of English, geography, history, practical science, mathematics, and drawing (freehand and designing). As also in the case of boys, the English should include English literature. Suitable physical exercises should also be provided. For admission, the provisions would naturally be similar to those proposed in the case of boys. Physical exercises, I should here point out, are emphasized for both boys and girls in all the countries I visited. For girls in particular, whose occupations are mainly sedentary, such exercises are indispensable.

Specialized industrial schools.

General industrial schools.

Importance of physical education.

Secondary industrial schools.

Secondary industrial schools are also desirable of the same character as the Boston High School of Practical Arts and the science department for girls in the Springfield Technical High School. More than one or two of such schools, we are, however, not likely to have in the near future. They are the product of large urban populations, and of a state of public opinion more advanced

than ours is in Ontario. The establishment of a Faculty of Household Science in Toronto University will hasten the advent of such schools if the matriculation examination for entrance to the faculty recognizes the household science that may be taken up in the secondary schools. An organization under which the university would continue to repeat the work of these schools would be neither consistent nor economical.

As a luminous and comprehensive statement of the situation I quote the communication I have received from Mrs. Huestis, the President of the Local Council of Women of Toronto, in reply to a letter from me asking for her views on the subject of industrial training for girls and women:

Statement by
President of
Local Council
of Women,
Toronto.

It is becoming quite evident to all that each year finds girls occupying a more and more important place in the industrial world. It is furthermore admitted by most employers that they enter into this new sphere almost totally unprepared by previous training. To those of us who have given this phase of the question serious consideration, the remedy seems to be in the establishment of trade schools similar to the Manhattan Trade School for Girls, either as separate schools or as branches of regularly established technical schools.

Present condi-
tion and
remedy.

Realizing the large numbers who leave the public schools at the age of fourteen to enter industrial life from economic conditions and also realizing the shortness of the time thus given to the securing of the necessary fundamental academic education in such subjects as reading, writing, arithmetic and spelling, I would be sorry to advocate during this public school course any special technical training other than domestic science. The girl who is thus forced into industrial life at such an early date must get her industrial training in either evening classes or in the establishment of part time day classes. That girls are willing and anxious to attend such classes is fully demonstrated by the very large registration of girls in the evening classes of the Toronto Technical High School.

No curtail-
ment of
general
education.

In considering the training necessary we must consider the industrial avenues which now lie open to girls:

Avenues of
employment
open to girls:

1. The numerous Clothing industries, for both men's and women's wear, demand large numbers. According to the department in which they serve, girls would require instruction in drawing and designing, cutting, draughting, hand sewing, ordinary machine sewing, power machine sewing, special machine work, such as buttonhole, lace, embroidery, and hemstitching machines, weaving, millinery, dressmaking, etc. 1. Clothing.
2. The Publishing and Bookbinding industries need large numbers of girls. These might be given instruction in drawing and bookcover and magazine cover design, illustrating, labelling, cutting, folding, and pasting. Under this head might be included the necessary hand skill required in the various novelty work departments. 2. Publishing and bookbinding.
3. Salesmanship is to-day one of the largest avenues for girls, and courses to fit them better for their duties are urgently needed. They should be given courses in the expert knowledge of the nature of the goods to be sold, as well as a training in the art of salesmanship with its necessary adjunct of courtesy, etc. 3. Salesmanship.
4. The avenue of Domestic Science is so exceeding important that all girls should have more or less training in this department. It should give the necessary professional training for those who intend to follow it as an occupa- 4. Domestic Science.

tion, viz.: for cooks, waitresses, general servants, etc. It should also give such training to all as will fit them to become the future home-makers of the land.

5. Drawing and designing.

5. As to Drawing and Designing: Girls have shown their aptitude for this line of work, and the various engraving and lithographic houses as well as many other establishments are urgently demanding girls who have the necessary skill in freehand drawing and design. This demand also extends along such lines as interior decoration for both private and public buildings, designs for wall paper, carpets, linoleums, tiles, textiles of various sorts, both printed and woven, furniture, silverware, stained glass, etc. The openings for girls along these lines are quite extensive and remunerative. As Canadian girls trained in Pratt Institute, New York, are making a success of church and house decoration in New York, could not our girls remaining in Canada have the same opportunities?

6. General Education.

In all cases, hand in hand with this special technical or industrial training which the girl may need should go whatever academic instruction is necessary to enable her to assume her proper business position so that advancement to higher and more remunerative lines might not be cut off. But besides all this the girl in the industrial world of to-day is the home-maker of to-morrow, hence the necessity for some training in household science. Furthermore, the physical education of the girls at all stages should be closely guarded, as little will be gained by giving the required industrial training if the girl's physical well-being is not guarded to enable her to perform her duties without encountering the physical breakdown so commonly occurring to-day.

5. INDUSTRIAL AND TECHNICAL SCHOOLS FOR WORKMEN AND WORKWOMEN

Sources of attendance.

For many years, in Ontario, as elsewhere, boys and girls, men and women, engaged by day in trades, etc., will be by far the most numerous of the claimants for industrial instruction. As soon as the day industrial and technical schools have been opened, an increasing number will have received some training before they take up their occupations; but, even to the most proficient, supplementary instruction will be of great advantage, while to the large numbers that will always be prevented by various causes from availing themselves, even in part, of day school instruction, special systematic training will be indispensable.

Claims of schools.

For the class of workers who cannot attend or who have not attended day industrial or technical classes I have to report, as the result of my investigations and experience, that, from the nature of the case, all the following are feasible for boys, and at least the evening school for girls:

- A. The Apprenticeship School.
- B. The Evening Industrial and Technical School.
- C. The Correspondence Industrial and Technical School.

A. The Apprenticeship School

Character.

The Apprenticeship School is a modification of the part-time co-operative school already described. In the latter the pupil, while attending school, goes to the factory for the supplementary practical

work. In the apprenticeship school, on the other hand, the factory hand comes to the day school. Of this kind of school a few exist in the United States. In the Cincinnati Continuation School, as it is called there, apprentices are given about four hours' instruction a week for forty-eight weeks. The school is under the Board of Education of the City, and is supported from public funds, at a cost of about \$15 a year for each pupil, 250 of whom attended in 1909-10, their wages being continued for the time spent in the school. The subjects taken up are mechanical drawing, blue-print reading, shop mathematics, civics, reading, writing, and arithmetic. This, of course, is an adaptation of the Munich continuation industrial school scheme for the instruction of apprentices. As I have pointed out, even already in Ontario an arrangement of this kind has been made between the High School at Sault Ste. Marie and the Algoma Steel Works of that city.

Cincinnati
Continuation
School.

School at the
Sault.

In my judgment, the part-time co-operative plan described above and on pp. 230-238, when suitably adapted to local conditions, might be introduced with advantage in Ontario, where evening schools or full-time day schools are not available, or where the evening schools do not make suitable provision. In support of this view, I may point out, as is shown by the evidence of many of our manufacturers in Appendix B, that, although decadent, apprenticeship is by no means dead in certain Ontario industries. Moreover, there is no likelihood of its being wholly replaced for many years to come by an adequate system of trade schools. What is most to be desired is a combination of apprenticeship and the trade school, which has in view the all-round education of the workman, and which is safeguarded from exploitation by the employer. But, in all cases, the employer holds the key to the situation. His object is, of course, to have the largest returns for the smallest possible expenditure, and it is perfectly legitimate that it should be so. Without a reasonable prospect of advantage to himself he would not employ at intervals young or untrained apprentices; nor, as he naturally aims at as complete specialization as possible, would he be likely to provide at a loss to himself the variety and the sequence of work indispensable in any adequate scheme of trade education. But the fact that voluntary, as well as compulsory, co-operative schools are at present in successful operation demonstrates their practicability in Ontario under suitable conditions.

Feasibility of
such schools.

Employer
holds the key.

In this connection I may discuss another class of apprenticeship schools which cannot be omitted in a comprehensive treatment of the subject. In the absence of outside facilities apprenticeship schools have been established and maintained by railways and great manufacturing companies themselves. Besides foremen who devote themselves during shop hours to the instruction of the apprentices,

Apprentice-
ship Schools
maintained
by Railways
and Factories.

Prussian
Apprentice-
ship Schools.

there are provided within the establishments during working hours or in the evenings classes in which are taught the theoretical parts of the trades, including drawing and such mathematics and science as are needed for intelligent workmanship. In Prussia some of the finest royal industrial schools have been developed from similar apprenticeship schools. At first such an institution is established by a local factory, aided by municipal funds, and managed by a board on which are represented both the factory and the municipality. When the school grows to be important enough, it is taken over by the Prussian Government and maintained and managed under its direction, the factory and the municipality continuing their contributions and being represented on the board of management.

In Ontario.

Conditions may not now be favourable to the general establishment in Ontario of such apprenticeship schools. As, however, is shown in Appendix B, one was established last September at the Dennis Wire and Iron Works in London. In time, no doubt, others will follow, and before many years it may be in the interests of some of our municipalities to contribute to the maintenance of such schools, and in the interests of the Province to supplement this contribution from the Provincial Treasury. I have not yet visited the school at London and it is too soon to predict its future, but there can be no doubt as to the efficiency of the system as I saw it in operation at the Grand Trunk Railway shops at Stratford. The apprenticeship school has the advantage over other part-time systems of being operated under actual business conditions and by expert instructors, who can at every step correlate the theory and the practice. It is altogether probable that, under suitable conditions, this type of school would be a partial and economical solution of the problem of providing skilled workmen.

Advantages
of apprentice-
ship schools.

B. The Industrial and Technical Evening School

General dis-
tribution.

In countries like Great Britain and the United States, which have only of late years awakened to the imperative need of systematic industrial education, the evening school is by far the commonest means of supplying the lack; and, where no day instruction is available, it is manifestly the only means. Indeed, the English and, as yet, the Scotch continuation schools are held in the evening. In the United States, wherever there is a day industrial school, almost invariably there are evening classes, and there are many evening classes where there are no day schools. In France, too, the evening class is still very common, and, in Germany and Switzerland, it is found, in many places, to be more convenient to hold the compulsory continuation school in the evening. The day industrial schools are more or less substitutes for apprenticeship. The evening

Character.

schools, on the other hand, merely supplement the imperfect and often specialized training of the workshops by broadening the pupil's acquaintanceship with the processes of his trade and supplying him with the theoretical knowledge he cannot obtain in the course of his daily work.

The evening school has one great advantage over the day school. Advantages over Day School. It overcomes the two main obstacles in the way of the day school— it does not interfere with the wage-earning of those who attend it; and it may be maintained at a comparatively small cost, for the equipment and accommodations used by day are available for it, and the part-time day teachers may be members of its staff. Disadvantages. But, even under the best conditions, the evening school must be less effective than the day school, for it has this serious disadvantage, that it is held when the mental capability of the pupil, especially of the young pupil, has been lessened by a day of toil. Moreover, as one might anticipate, and as is shown by the evidence in Appendix B, the young workman does not realize the value of his opportunities, and sacrifices future gain for present pleasure. This disadvantage might, however, be overcome if, as some now do, the manufacturer required his apprentices to attend. Another disadvantage is the difficulty of effective organization except where there are large staffs. The evening school should provide for the workman in all stages of his advancement. In it must be represented the general and the special industrial schools and the technical schools, with their varied courses. Here, however, in particular, the courses must be flexible, and special consideration given the needs of the individual. Provision must also be made for both sexes, and for adults as well as adolescents. On the latter score there is usually little trouble in Germany and Switzerland, where, owing to the developed condition of their systems, the age and attainments of those attending the evening classes are fairly uniform; but, for a good many years, owing to the adults' self-consciousness, effective organization will, with us, continue to be a difficult problem. Moreover, as the limitations of the evening classes are such that the instruction in each subject can be provided not more than two or three times a week, and not more than a couple of hours each evening, such courses must be less comprehensive than those of the corresponding day school or they must entail much longer attendance. Notwithstanding these drawbacks, the evening school must, for many years, be our chief reliance. Evening schools our chief reliance. After all, as, indeed, is demonstrated by the attendance at the Hamilton and Toronto Technical Schools, the devotion of five or six hours a week to directed and assisted evening study, which will increase their wage-earning power, is not so serious a tax upon the ambitious and healthy workman and workwoman. Nor should the educationist overlook the

moral advantage of such useful occupation of the evening hours, especially to the adolescent.

First step in evolution.

Legislative grants.

Qualifications of staff.

In the evolution of a system of industrial education in this Province the first stage must be the evening school. A few, indeed, have been already established, and if, as is probable, competent teachers of industrial subjects—drawing in particular—are procurable in other centres, progress might be made, pending the establishment of a comprehensive system. The Government should, I think, defray a share of the cost of maintaining such schools; a larger grant being given a village than a town, a town than a small city, and a small city than a very large one. In Nova Scotia a number of evening schools are in operation to the support of which the Government and the locality contribute equally. Here, as there, competent foremen and specially qualified teachers might be employed. For the purpose of a workshop education the apprentice “takes little stock” in the qualifications of day school teachers of the academic subjects.

C. The Correspondence-Study Industrial and Technical School

Fees paid Scranton School by Ontario.

Trade courses offered.

The Scranton Correspondence School, which is controlled by the International Printing Company of that city, with a capital of \$6,000,000, is probably the largest school of the kind in existence. Its advertising literature shows that in October, 1906, its Canadian agencies contributed \$180,000 to the yearly receipts. Most of this must have been collected from the workmen of the Dominion; most of it, also, must have been collected from the workmen of Ontario; and, as the industries of the Dominion are rapidly increasing, the total sum collected must now be much larger than that given above. A half a million of dollars is, I believe, now a moderate estimate, although some put it at a far higher figure. The school is maintained solely for the gain of its stockholders, and, like any other business house, it sends out “salesmen,” who canvass the various districts into which the management has divided the United States and Canada, and even far New Zealand, Australia, and South Africa. When a high school inspector I met these salesmen more than once in hotel offices, where they were relating to eagerly listening workmen the advantages of the correspondence school. This company offers for workmen trade courses in drawing, lettering, sign painting, plumbing, heating and ventilation, sheet-metal work, boilermaking, and shop and foundry practice; and technical courses in architectural drawing, civil engineering, electrical engineering, mechanical engineering, mining, steam and marine engineering, structural engineering, telegraph and telephone engineering, and textiles.

One of the chief reliances of the school is its list of text-books specially prepared for industrial work. The claim that the list is a good one is well supported. We also must have suitable text-books for all grades of our industrial schools.

The International Typographical School of Printing, at Chicago, is under the direction of the International Typographical Union's Commission on Supplementary Trade Education, and is supported by fees from students and appropriations from the International Typographical Union. The existence of this school under its conditions shows the value the workman attaches to the instruction given. Its object is to counteract the evils of specialization as practised in printing offices. This school is an institution with an educational, not a commercial, aim, and, I may add, is strongly favoured by the American Federation of Labour. In its report of 1909 this federation gives a list of seven other labour organizations that have undertaken a similar extension of education for their members, and takes occasion to commend enthusiastically such "supplemental technical education," and to report that it should be provided at the public expense.

The desirability of schools of this character was first suggested to me by some of the representatives of organized labour in the city of Toronto, and I have found on enquiry a very general desire on the part of labour men that a correspondence school should be provided in Ontario. It certainly appears to be reasonable that, in providing the workman with instruction, his convenience and necessities should be taken into account. Even when we have secured a system of day and evening industrial and technical schools, many will not be able to avail themselves even of the evening classes. There will also be small manufacturing centres—too many I fear—where it will be impossible to maintain evening classes effectively organized or evening classes at all.

In my account of the provision for industrial training in the United States, I have described the Correspondence-Study School of the Extension Department of Wisconsin University, and have pointed out in particular the effective means this University is taking to supply in its school the defects of the Commercial Correspondence School. A school of this character, which would combine with class instruction by travelling teachers the best features of the Commercial Correspondence School appears to be a necessity in this Province. The combination is, however, also a necessity; for, as is well known and as is clear from the evidence of the Principal of the Brantford Collegiate Institute in Appendix B, few workmen succeed in getting an adequate return for their fees.

6. GENERAL PROVISIONS

General Industrial School necessary. Special Industrial Schools, contingent.

Obligation on employers and employees.

In the foregoing statement I have set forth the classes of industrial and technical schools which my investigations and experience lead me to regard as feasible in Ontario under suitable conditions. The General Industrial School, modified to suit the varied local requirements, is a necessity in every manufacturing centre. The establishment and the organization of the Special Industrial School, in particular, will, however, depend upon the nature of the local industries and the attitude of the local manufacturers, labour men, and school boards. Accordingly, it does not fall within the scope of a report like the present one to deal with the details of the subject; nor, indeed, could anyone devise a scheme of organization or a curriculum of study applicable to every locality. In the case of the General Industrial Schools, certain subjects, as I have already shown, should find a place; but the details of most of these subjects and the organization of the other classes of schools must, as I have just said, depend upon local conditions. In this connection it is necessary for me to point out that while the Government and the School Boards have important parts to play in the development of a general scheme, much will depend upon the manufacturer and the employer. If, as a few do even now, the employer refuses to admit to his works a boy who has not taken such preparatory courses as the locality may afford, if he requires his employee to take advantage of any facilities that may be offered to supplement his shop work, if he makes no deduction from his pay when, in doing so, the employee has to absent himself from his work, and especially if he recognizes in his pay-sheet efficiency thus increased, Ontario will soon have a satisfactory system of industrial schools. Organized labour can also do much to secure this result. Probably one of the chief obstacles to progress will be the limitation of the number of apprentices to each employer. In a condition of the labour market in which practically any one may qualify as an apprentice and the unqualified may pose as a journeyman, the labour organizations have some justification for this restriction; but, on the other hand, all experience shows that there is no danger of too large an increase in the supply of skilled labour through industrial schools that limit the age of the students and insist on thorough and comprehensive courses of instruction. Too much stress cannot be laid upon the necessity for sympathetic and harmonious action by the employer and the employee. Both now are crying vigorously for governmental assistance. The waggoner in the fable calls on Jupiter to help him with his wagon, which has stuck in the mud. Jupiter's answer is well known.

Some questions of a general character which are vitally important in the operation of a state system of industrial and technical schools remain to be considered:

1. The Qualifications of the Teachers.
2. A Director of Technical and Industrial Education.
3. An Ontario Industrial and Technical College.
4. A Dominion Institute for Industrial Research.

A. The Qualifications of the Teachers

In any scheme of education, the question of the qualifications and training of teachers is a basal one, and it is especially so in the case of industrial and technical education, which, being in most respects a specialized form of education, requires teachers specially trained. Without teachers so trained, it would be useless to attempt to put into force programmes of study, be they ever so suitable. In all the European countries I visited, especially in Germany, provision is made for training such teachers, and inducements are offered them to avail themselves of it. Even in these countries, however, this is the part of the organization that often lags behind. Wherever industrial education has proved to be unsuccessful, its failure, I was invariably told, was due chiefly to defects in the teaching.

Special necessity for training.

For technical high schools we must have technically trained graduates—men who have taken up science and mathematics as well as the shop work from the industrial point of view, and who are pedagogically fit for their work. For special industrial schools competent workmen of the foremen grade are no doubt available; but, to be efficient instructors, these require special training; and for the complementary sciences, mathematics, and English, specially trained teachers will also be necessary. Most of our workmen do not possess the necessary theoretical knowledge of their trades; their general education is too often defective; and they have, of course, had no pedagogical training. For our general industrial schools in particular, we must have teachers who know and can teach the other subjects of the course, in addition to and in correlation with the drawing and the wood and metal work which have so far been the mainstay of the manual training departments. In this class of school, satisfactory results are best obtained when the related subjects are taught by the same teacher. At this stage he alone can correlate them properly. The department system is, however, often followed; and, when there are a number of teachers on the staff who act together under a strong and watchful principal the system appears to produce good results. But for a good many years the staffs of most of the schools will be small, and it will take time to secure generally an industrial outlook. For this reason it

For Technical High Schools.

For special Industrial Schools.

For General Industrial Schools.

Manual training teachers not qualified.

How to secure qualified teachers.

Example of Ireland.

should be clearly understood that the manual training teacher is not now fully qualified for a position in an industrial school. We need, accordingly, to supplement his present education and to provide for that of the teachers of the technical and special industrial schools. For the former, the summer school would probably suffice; for the latter, ampler provision is indispensable.

The history of the manual training movement in this Province, shows us that, with a very limited number of available positions and especially with an uncertain future, few are willing to prepare themselves for specialized work even when, as is the case at the Guelph Macdonald School, suitable courses have been provided and, when, as has too often been the case, disproportionately large salaries have to be paid to obtain even meagerly qualified teachers. If we are to have within a reasonable period an adequate supply of competent teachers for the different classes of our industrial schools, we must for some years provide, besides free tuition, an allowance for travelling expenses and maintenance while they are preparing themselves for their duties. Such expenditure should, however, entail upon the teacher an obligation to serve the Province at a reasonable salary for a period of years. Some such plan as that followed in the Grand Trunk Railway apprenticeship system at Stratford would probably meet the case.

In support of the foregoing proposal, let me quote a special example: When in Europe, I intended to visit Ireland as well as England and Scotland, but the time at my disposal would not permit. I found, however, then, and since by correspondence, that Ireland has made extensive provision for agricultural, industrial, and technical education. For this purpose over \$1,000,000 is spent annually, a small part of which comes from local sources, by far the larger part coming from endowment funds and parliamentary grants. One prominent feature of the Irish system is the provision made for the training of the teachers. At various centres facilities are offered journeymen and other workmen to fit themselves as trade school teachers. From a fund for this purpose \$3.75 a week is allowed each teacher for a year. For those engaged in teaching, summer schools are provided, in which are courses in experimental science, laboratory work, drawing and modelling, manual training, domestic science, crochet work, embroidery, etc. For the summer school students a maintenance allowance, with travelling expenses, is also provided. In addition, special scholarships for science teachers are offered in the Royal College of Science for Ireland. These carry free tuition, travelling expenses, and a generous maintenance allowance. For art teachers similar provision is made in the Metropolitan School of Art.

Nor in providing our teachers should we, if need be, confine ourselves to the Province of Ontario. No narrow spirit of exclusion should prevent us from securing the best. When, for example, I visited the Arts and Crafts School of Zurich, a large majority of the teachers were, I found, from France and Germany, and the authorities there hold that nationality should not enter into a question of educational supply. When, too, about a quarter of a century ago Japan determined to establish a modern system of education, not only did she send her men to study in the schools and colleges of Europe and the United States, but she imported teachers for her own schools and colleges. Now she has teachers trained by herself, and to this wise initial policy, more than to anything else, must be attributed her phenomenal progress.

Selection of teachers should not be confined to Ontario.

With an adequate supply of teachers the day school problem will present little or no difficulty. For the evening schools the day school teacher whose time is wholly taken up in his regular duties should, for evident reasons, not be employed. The solution of the evening school problem will be found in the employment of part-time day school teachers, of competent foremen and draughtsmen, engaged during the day, and probably of travelling teachers who are members of the staffs of more than one school.

Solution of problem of supply.

B. A Director of Technical and Industrial Education

My recommendations in regard to the types of schools and courses of study suitable for each locality have designedly been indefinite. From the nature of the case they could not be otherwise. My experience leads me to endorse most heartily the opinion of Mr. Arthur D. Dean, Chief, Division of Trade Schools, Albany, N.Y., whose address I heard a year ago at the annual convention of the National Society for the Promotion of Industrial Education at Milwaukee, and whose official experience enables him to form a reliable judgment on the question:

Recommendations designedly indefinite

In considering a State policy for providing industrial education it is necessary to keep constantly in mind one basic principle: If industrial education means a redirecting and adapting of our education to fit the economic and social needs of our people, then it is a problem that has no single solution; there will be as many school classifications as there are groups of industries, nearly as many solutions as there are types of communities, and there is no single inflexible course of study and no single line of procedure.

Organization must be elastic.

Since I began this report I visited most of the centres of Ontario where industrial schools may be expected in the near future, and I have visited and corresponded with employers and employees as well as the principals in charge of the present manual training schools. Everywhere I went there is evidence of a desire for the establishment of industrial schools, but everywhere there is also a lack of definite ideas as to their probable cost, their scope and method, and

Attitude of public towards industrial education.

the best way to engraft them upon our present school system. What is now needed is expert guidance rather than the stimulation of public opinion.

Necessity for expert direction.

The history of this movement has shown clearly that, with the best intentions, but without competent direction, boards are liable to make serious economic and educational blunders. A few weeks' visit to schools of the character I am discussing will not enable the layman of the school board to settle problems which require technical knowledge, both expert and educational. The expenditure involved is too great and the interests at stake are too important to be left entirely to his discretion.

Each industrial centre a separate unit.

I have, accordingly, to recommend, subject to the provisions of any general scheme, that each industrial centre shall be regarded as a separate unit for the purposes of organization; and that, as proposed later in this report, the industrial and technical school or schools for each such centre be organized by its board of trustees under the advice and with the approval of the Minister of Education. For this purpose, I recommend that this branch of the service be placed in charge of a departmental officer, whose duty it shall be to visit each manufacturing centre and formulate a plan of organization, after consultation with the school board and representatives of the local industries. This officer should have had technical training of a general character; and he should be an educationist in sympathy with the aims and methods of elementary industrial training.

A Director of Industrial and Technical Education.

C. An Ontario Industrial and Technical College

Drawbacks to progressive efficiency.

As is well understood and as is shown by the evidence of the manufacturers in Appendix B, the lack of competent foremen and the higher grades of skilled workmen is now probably the greatest drawback to the progressive efficiency of our industries. As a matter of fact, the evidence shows further that our employers have often to draw such employees from the ranks of British and foreign labour. Besides, the workman who has learned his trade in the usual way becomes fully expert therein at 24 or 25, so far as mechanical operations are concerned. If he has had some theoretical training as well, he will, of course, know his trade better; but, ordinarily, he can advance no further. Manifestly, therefore, if we are to have high-class workmen, "made in Ontario," we must provide high-class instruction. I have already pointed out, also, the necessity for training the teachers of our manual training and industrial schools, and for establishing a correspondence-study school which shall combine with instruction by letter special class instruction by travelling teachers. This necessity must be met, and it should be met as promptly as possible. If we were to follow the

Necessities of the situation.

example of some of the long-established British technological schools, we should add to the functions now discharged by the Faculty of Applied Science and Engineering of the University of Toronto, the first two of the above functions, which are industrial in character and come within the limits of secondary education. If, also, we followed the example of Wisconsin and some other universities in the United States the Provincial University would provide, as part of a comprehensive system of extension work, a correspondence-study school for workmen. But in our system of education the Faculty of Applied Science and Engineering corresponds to the "High School," in the German system with its purely technical course of the university grade; and Wisconsin University has carried on its industrial correspondence-study work in a State where only lately provision has been made for trade schools, and it intends to carry it on in future only in localities for which adequate industrial schools are not provided. For us now to follow the foregoing examples would be to make an addition to the courses of the University, both exceptional and unnecessary. Moreover, the Dean of the faculty at Toronto informs me that the time of his staff is now fully occupied, and that to add industrial functions to its present technical ones would necessitate an additional staff, additional accommodations, and additional equipment, all specially adapted to the new requirements. It is important, also, to note that the aims of the proposed departments would be quite different from those of the present faculty. Little or nothing would be gained by association with it. Subdivision of labour and singleness of purpose have their advantages under any conditions, and the workman deserves as much consideration as the engineer.

Example of
Great Britain
and the
United States

Faculty of
Applied
Science and
Engineering
of the Uni-
versity of
Toronto,
unsuitable.

I recommend accordingly, that an Industrial and Technical College be established and maintained by the Provincial Government for the further training of the most progressive of our foremen and skilled workmen, for the training of the teachers of our industrial schools, and of pupils who have taken the courses at the special industrial schools, for the conduct of a modern correspondence-study school, and for such other purposes as may promote the interests of the industrial worker. Even if we had what we are not likely to have for a good many years—well staffed schools—we should still need a college of this kind; and, until we have such schools we shall need it especially. Most, if not all, of the first teachers of such a college must be drawn from outside the Province; or, as Japan did, Ontario must send her men abroad to prepare themselves for their duties. By adopting the latter policy we should be more likely to secure the teachers we need. It would, of course, entail some delay; but "a good beginning is half of the whole." Competent teachers for our schools we must have at any

Establishment
of a Provincial
Industrial
College.

Competent
teachers
indispensable
from the first.

cost, and their training must be provided for in this Province. We need a new breed, with a new outlook and with new ambitions. To attempt to organize a system without first providing for the training of such teachers would be most unwise.

An Industrial Museum.

In such a College would naturally be placed the first of our Industrial Museums. The part such museums play in the industrial history of the European countries, I have already pointed out. Ontario cannot afford to ignore their importance.

D. A Dominion Institute for Industrial Research

Intimate relation between technical education and the industries. In Germany:

Imperial Institute at Charlottenburg for Physical-Technical Research.

One of the most important developments of the German industrial system is the intimate relation that exists between her manufacturing establishments and her higher technical institutions. This intimate relation, it is well known, has done much to promote her industrial eminence. To this end, both the States and the Empire contribute. Not only do the States give the industries direct assistance in their operations,* but they carry on research for their benefit, often with the assistance of the larger manufacturers, who place their staffs at the disposal of the scientists. The Imperial Government maintains at Charlottenburg the Imperial Institute for Physical-Technical Research, which gives special attention to the advancement of the manufactures of the country at large. To use the words of its constitution, its object is "the promotion, by means of experiments, of scientific research and of precise technical work." Its syllabus covers the various departments of physics and chemistry, and includes the testing of various kinds of measuring instruments. In one of its divisions the members of the staff attend meetings of scientific and technical workers, and inspect the testing stations and the large manufactories throughout the Empire. In 1908 this institute cost for maintenance \$113,500.

In France: National Conservatory of Arts and Trades at Paris.

Nor is Germany alone in making such provision. At Paris the National Conservatory of Arts and Trades, also supported by the

*In association, for example, with the Technical High School at Charlottenburg, there is an organization known as the Royal Material Testing Institute, situated in Gross Lichterfelde, one of the suburbs lying to the south of Berlin. Like the High School, the institution is maintained by Prussia. It is devoted more especially to the examination and testing of materials used in various departments of technical work. Its functions are:

(1) To plan experiments and to design machines, instruments, and apparatus generally, for making tests of materials in the public interest.

(2) To carry out tests with materials and construction parts in the public interest or in the interests of science. To make such tests for governmental departments and private individuals upon payment of certain fees, and, in connection with the results of these tests, to give official advice and to grant official certificates.

(3) Upon request of both disputants, to act as arbiter in disputes over the quality of material or construction parts employed in technical work.

This institution comprises six departments devoted to (1) metal testing (2) building material testing, (3) paper and textile testing, (4) metallography (5) general chemistry, and (6) oil testing.



ENGINEERING BUILDING
Faculty of Applied Science, University of Toronto.

State, does work of a similar character. Research, however, is not the chief part of its programme. It contains a great industrial museum, wherein are deposited machines, models, tools, plans, descriptions, and books relating to all kinds of arts and trades; and it undertakes the inspection of weights and measures and carries on experiments in connection with this work. This institution provides also, without fee, various courses of lectures dealing with the application of science to industry and commerce, and addressed chiefly to the artisan class.

In Switzerland the Federal Government maintains the Polytechnic at Zurich, which, like the French Conservatory, discharges a variety of functions. Above all, it is a great school of applied science, similar in many respects to the Technical High School at Charlottenburg, the Massachusetts Institute at Boston, and the Faculty of Applied Science and Engineering at Toronto. But it combines the functions of a technical high school with those of an institute of research. In passing, I may point out that Switzerland has a population of only 3,463,000; Canada, one of between seven and eight millions; and that Switzerland is very poor in the raw material for manufactures; Canada, exceptionally rich.

In Switzerland:
land: The
Polytechnic
at Zurich.

Switzerland
and Canada
contrasted.

The English parallel of the Imperial Institute at Charlottenburg is the National Physical Laboratory at Bushy Park, Teddington, near London. This laboratory was completed and opened in 1902, and is under the direction of a governing body which consists chiefly of members nominated by the Royal Society, with others selected to represent various commercial and industrial interests. The laboratory was founded for the testing and verification of instruments for physical investigation, for the construction and preservation of standards, and for the systematic determination of physical constants and numerical data useful for scientific and industrial purposes. It is under the direction of a highly-trained specialist, and consists of a number of divisions, each fully equipped with apparatus both for making regular tests and for carrying out investigations of public and scientific interest. The character of the work is somewhat varied. It includes the study of the optical qualities of glass, thermometry, pyrometry, the study of wind pressure, the metallographical study of alloys, photometry, and quite recently a large experimental tank was installed in the laboratory for the purpose of studying the behaviour of ship models under a variety of conditions. The expenditure for the laboratory in 1909 amounted to \$170,148, of which \$80,256 came from Treasury Grants. From private sources in the same year came also \$97,334 for the experimental tank above referred to, and \$48,667 for a building for metallurgical research.

In England:
National
Physical
Laboratory
near London.

Imperial
College of
Science and
Technology in
London.

The Imperial College of Science and Technology, recently established in London, England, takes part in furthering the interest of

the manufactories. In the words of its constitution, it has for its object "to give the highest specialized instruction, and to provide the fullest equipment for the most advanced training and research and the various branches of science, especially in its application to industry; and to do all and any of such things as the governing body considers conducive or incidental thereto, having regard to the provision for these purposes which already exist elsewhere."

In the United States: Bureau of Standards at Washington.

The Bureau of Standards at Washington is a branch of the Department of Commerce and Labour of the United States Government. In addition to the work of verifying standards of various kinds, it also carries on such investigation and research as may be of importance to the scientific, technical, and manufacturing interests of the country.

Although my report deals primarily with the obligations of Ontario, it is not out of place to ask here what work the Dominion of Canada is now doing for her industries of a character similar to that done by the institutions I have described.

Similar provision by the Dominion: The Department of Mines.

The Department of Mines was created and placed under a Minister of Mines in 1907. Its technical work is carried on in two branches, the Mines and the Geological Survey. The Mines branch is divided into the outside service, to which the Assay Office at Vancouver is attached; and the inside service, with headquarters at Ottawa, which is organized for administrative purposes into the following divisions: Metal Mines, non-Metal Mines, Fuel and Fuel testing, Chemical, Mineral Resources, and Statistics. During the present session, it is understood, an Act will be passed providing also for the regulation of the manufacture, storing, and testing of explosives. In this department a great deal of experimental work is carried on. The Geological Survey Branch is organized into the following divisions: Administrative and general, geological, palaeontological, mineralogical, topographical, natural history, draughting library. At present this branch is collecting and caring for material for the new Victoria Museum.

The importance of the Department of Mines may be gleaned from the fact that of late years the value of the mineral output of Canada has been increasing very rapidly. The Department places it at \$90,415,763. For the fiscal year 1910-11, the total vote for the Department of Mines for all purposes is \$621,289, which includes a special grant for the investigation of processes for producing zinc. Under the Department of Marine and Fisheries, the Dominion Government also maintains three biological stations—one at St. Andrews, N.B., and one at Nanaimo, B.C., for the investigation of the natural history of our salt-water seas, with

The Department of Marine and Fisheries.

special reference to the fisheries, and one at Go Home Bay, Ont., for similar investigation in regard to our fresh-water seas.

Before 1884 agriculture in Canada was in a depressed condition. In that year a committee appointed by the House of Commons to enquire into the best means of encouraging and developing agriculture showed clearly that its condition was due to widespread ignorance amongst the farming community, which led to defective farming and the adoption of wasteful methods. The committee recommended that experimental farms be established, where tests should be carried on in all branches of agriculture and horticulture, and that the results of this work should be published in bulletins from time to time and distributed free amongst the farmers of the Dominion. In 1886 an Act was passed almost unanimously authorizing the Dominion Government to establish experimental farms for the aforesaid purposes. The five farms at first established, the central one being at Ottawa, have been increased to nine, with three smaller stations; and for the last financial year the cost of the system was nearly \$135,000. Agriculture is undoubtedly still the most important industry of the Dominion; but in Ontario and Quebec, in particular, the manufactures are developing with great rapidity, and, owing to our increasing population and the abundance of our natural resources, they are likely to develop with even greater rapidity.

The Department of Agriculture.

But, besides providing for the industries, so-called, the United Kingdom and the foreign countries I have mentioned above make similar provision for agriculture. France, for example, has Agronomic Stations attached to her universities and agricultural stations.

We cannot now say of our manufactures, as was said in 1884 of agriculture, that they are in a depressed condition; but we can say that ignorance of the best means of utilizing our resources has prevented us from reaping the full advantage of their richness.

The Dominion Government has thus recognized three of our main sources of wealth—our mines, our fisheries, and our farms and forests. It also maintains at Ottawa the Standards Branch of the Department of Inland Revenue, which administers the Acts dealing with weights and measures, gas, the inspection and exportation of electricity, the adulteration of food, agricultural fertilizers, commercial feeding stuffs, the inspection of petroleum, patent medicines. As in the foreign institutes, we have, in this Bureau at Ottawa, what might become the nucleus of an institute to carry on research work, bearing upon all the trades of the Dominion, and, until our Provinces are wealthier and their industrial necessities greater, to perform for the Dominion the duties now performed for Prussia by the Royal Material Testing Institute.

The Standards Bureau at Ottawa.

A Dominion Technical Institute.

The general interests of agriculture, the mines, and the fisheries are each under the charge of a Dominion Minister. This country needs also a Dominion Institute of Industrial Research, and the Minister of Trade and Commerce, to whose department it would naturally belong, might well have an eye to the advancement of the manufactures of each of our provinces.

II. DRAWING AND ART EDUCATION

1. PRESENT PROVISION, PROVINCIAL

Importance of
Drawing and
Art.

In all the countries I visited great importance is attached to the Fine Arts and their applications to the industries. Every centre of any importance has its picture gallery and its art museum with technical and industrial art departments. Drawing and applied art are universally regarded as basal, and provision is, accordingly, made for the instruction of workmen as well as of artists. In Germany, for example, the amount of attention given to drawing is very striking. Moreover, the schools are supported both by the locality and by the State. If there is one department more than another in which Ontario lags behind it is in the department of drawing and art. We have as yet no effective organization for training students; and, as a result, some of the more ambitious go to the art schools of the United States. Skilled engravers and lithographers are imported from the same country, and a good deal of our high-class illustration and printing is executed there as well. Of the correctness of these statements the evidence in Appendix B, of the manager of the Toronto Engraving Company, himself an artist of repute, leaves no reasonable doubt.

Defective
provision in
Ontario:
results.

Progress in
Provincial
Schools.

Since 1904, when the revised curriculum went into operation, specially qualified art teachers have been appointed in our Normal Schools, and there has been a steady advance in drawing and art in our Public and High Schools, especially on the purely artistic side. But there is still much room for improvement. As I have noted in dealing with manual training, two years ago provision was made at Guelph for industrial drawing for Normal School teachers-in-training, but the subject has so far received little attention except where there are manual training centres. In the United States nearly every city or town of any pretensions has one or more supervisors of art instruction for its elementary and secondary schools to the very great advantage of education. Only three cities in this Province have so far appointed such officers for their Public Schools, but the improvement of the subject in these centres amply justifies the means. Few primary or secondary teachers, however, are specially qualified to teach this department. Some have attended the art summer schools of the University of Toronto, but most have merely picked the subject up. To illustrate partly the apathy of the

Provision in
the United
States.

Defective
qualifications
of teachers in
Ontario.

public and the teachers, and partly the dominating influence of our examination systems, I may point out that, although the Department of Education offers an annual grant of \$25.00 to each school board and \$75.00 a year to each High School specialist in Art maintaining an Art class of six in the Middle School, only one of the 146 High Schools and Collegiate Institutes has attempted the course. So far as concerns the Province at large, almost no provision for advanced work is now made outside of a few schools, some of which are private. Some years ago Art Schools were established at Toronto, Hamilton, London, Kingston, St. Thomas, Ottawa, and Brockville, which received small grants from the Ontario Legislature. Of these all have gone out of existence except two—the one at Hamilton, which has become merged into the Hamilton Technical School, and the one at Toronto, which has become the Central Ontario School of Art. The other art schools were established, it would appear, in advance of public opinion, and, consequently, they failed to comply with the moderate requirements of the Department of Education.

Little provision in Ontario for advanced work.

In any system of industrial and technical training the claims of art instruction cannot be overlooked. We need good teachers and at least one institution in which they may be adequately trained. Toronto should possess a well organized and generously maintained school of art and design, and the other principal centres of population should have at least efficient art departments as part of their school systems.

A special Training School needed.

2. PRESENT PROVISION, VOLUNTARY

(1) CENTRAL ONTARIO SCHOOL OF ART AND DESIGN

One voluntary institution deserves notice as much for what it has already done as for what it may yet do. To the Central Ontario School of Art and Design the Province owes more than to any other school the progress she has made in art. Here have been trained artists of no mean ability, and the heads of the art departments in the engraving and lithographing houses of the city. For some years the school has been receiving a grant of \$600 from the City of Toronto and of \$400 from the Ontario Government. Beyond these grants and a few subscriptions it has had to depend upon the fees from the students, which have necessarily been kept as low as possible. The school is not a commercial institution; any surplus it may have at any time is used to procure or renew its equipment. In 1909-10 the total receipts were only \$3,377.14, although the classes were attended by 126 students. Most take the evening classes and are employees in some branch of industry for which an art training is required, or they are qualifying themselves for some such occupation.

Character, support, and attendance.

The curriculum embraces the following branches:

Subjects of curriculum.

Pictorial composition, illustrating, lettering, book-binding and leather work, illuminating, engraving, mural decoration (including wall papers), leaded glass, ceramics, jewellery, textile fabrics, carving, metal work and casting; etching, and general principles of constructive design and their relation to exterior and interior decoration.

For two evenings a week there is a class from the nude, for men only. This class is supported by the Royal Canadian Academy, from funds supplied by the Dominion, and consists of students whose work has passed a committee appointed by the Academy. About a dozen attended in 1910.

Qualifications of staff.
Equipment.

The staff of the school consists of local artists of established reputation. But the equipment is quite inadequate; all the original casts and art accessories were destroyed in the fire that took place a couple of years ago. The casts have been partly replaced by subscription, but the equipment is not yet so good even as it was before the fire.

Present necessities

To enable this school to train both artists and skilled workmen the following are necessary:

Suitable accommodations, a greater range of courses, a larger staff, additional equipment, a reference library. Weekly lectures are also necessary to stimulate the student and broaden his outlook. In time scholarships should be provided. Besides rewarding merit, they would prove an incentive to study, especially if, as in other countries, they assisted the students to study in the picture galleries of Great Britain and the Continent.

Accommodations, present and future.

At present the school is in temporary quarters on Yonge Street, having been obliged to vacate the premises on King Street which it had occupied for many years. There is, however, every prospect that, in the near future, adequate and suitable accommodations will be provided. By the wills of the late Goldwin Smith and his wife the property in Toronto known as "The Grange" has been donated to the Art Museum Association. In the rear of this building the association intends to erect a gallery for exhibition purposes. Here, also, it is confidently expected, class-rooms will be provided for the Art School.

A special school for the Fine Arts necessary.

As I have already pointed out, compared with other countries Ontario is sadly lacking in its provision for art. In the new Toronto Technical School building about to be erected one of the most important departments should be that of Industrial Art and Design. While such a department cannot be efficient if it does not give due prominence to the artistic side, it will, in function, be auxiliary to the industries. This instruction, but of a higher character, the Art School should also provide, while performing its main function of being auxiliary to the Art Museum Association. This is an im-

portant matter. As I pointed out in my report on the schools of Paris, it is to the association of the fine and the applied arts that France owes the artistic supremacy of her manufactures.

Artists claim that in an art school there is an environment which gives inspiration to the student, an inspiration not usually or necessarily found in a technical school, with its different associations and its different aims. This opinion, which the Philistine usually scoffs at, I discussed with many educationists during my tour, and I have to report that the opinion is general that, if the Fine Arts are to flourish in this Province, a high class Art School cannot be successfully merged into a Technical School.

In the Central Ontario School of Art and Design we have an established institution which stands well in the estimation of the art-loving public and which has done its share in the promotion of education. I feel justified in recommending that its Board of Management be so reorganized as to be of a more representative character, and that the school itself be assigned a definite place in the provincial system. Such a reconstruction would probably weld together all the art interests of the city, and secure more liberal support from both the Legislature of the Province and the City of Toronto.

Re-organization of management proposed.

If we are to make progress in art we must have in our schools competent teachers of art. Outside of the elementary courses of the Normal Schools and the Faculties of Education no provision exists for training them at present, and very few, indeed, are able to pass the departmental examination for a specialist's certificate. Properly maintained, this art school would supply such teachers and at the same time promote directly the interests of both the fine arts and the industries.

S carcity of competent teachers.

(2) OTHER PROVISIONS FOR ART

Although the Department of Education has not so far succeeded in doing much for the advancement of art, a number of voluntary associations have been formed for its promotion. The chief of these are the Royal Canadian Academy of Arts, the Art Museum Association of Ontario, and the Ontario Society of Artists. Others in Toronto are the Canadian Art Club, an offshoot from the last named; the Toronto Society of Applied Arts; the Graphic Arts Club, consisting of illustrators of various kinds; and the Toronto Association of Architects. All the foregoing institutions hold exhibitions, but the Central Ontario School of Art and Design is the only teaching body. On account of the far-reaching nature of their constitutions, two others deserve special notice: The Royal Canadian Academy of Arts, established by the Dominion Government at the instance of the

Voluntary associations.

Marquis of Lorne when he was Governor-General, holds exhibitions in the large cities of the Dominion alternately, and has begun a Canadian national gallery at Ottawa. From the Dominion Government it receives a grant of \$2,000 a year, which it may spend on pictures or in assisting provincial organizations. Some details of its constitution I will give later in connection with the subject of Dominion contributions for educational purposes. The purpose of the Art Museum Association of Toronto, to which I have already referred, is the cultivation and advancement of the fine and applied arts by means of the establishment and maintenance of a building for the purpose of such arts, the holding of exhibitions therein for art purposes, the acquiring of works of art for a permanent gallery or museum, and the education and training of those desirous of applying themselves to art studies.

The necessities of the situation.

It is evident from the foregoing statement that we have already much of the machinery needed for the proper advancement of Art. What is still needed is its reorganization and extension, and, above all, its proper financial support.

III. AGRICULTURAL EDUCATION

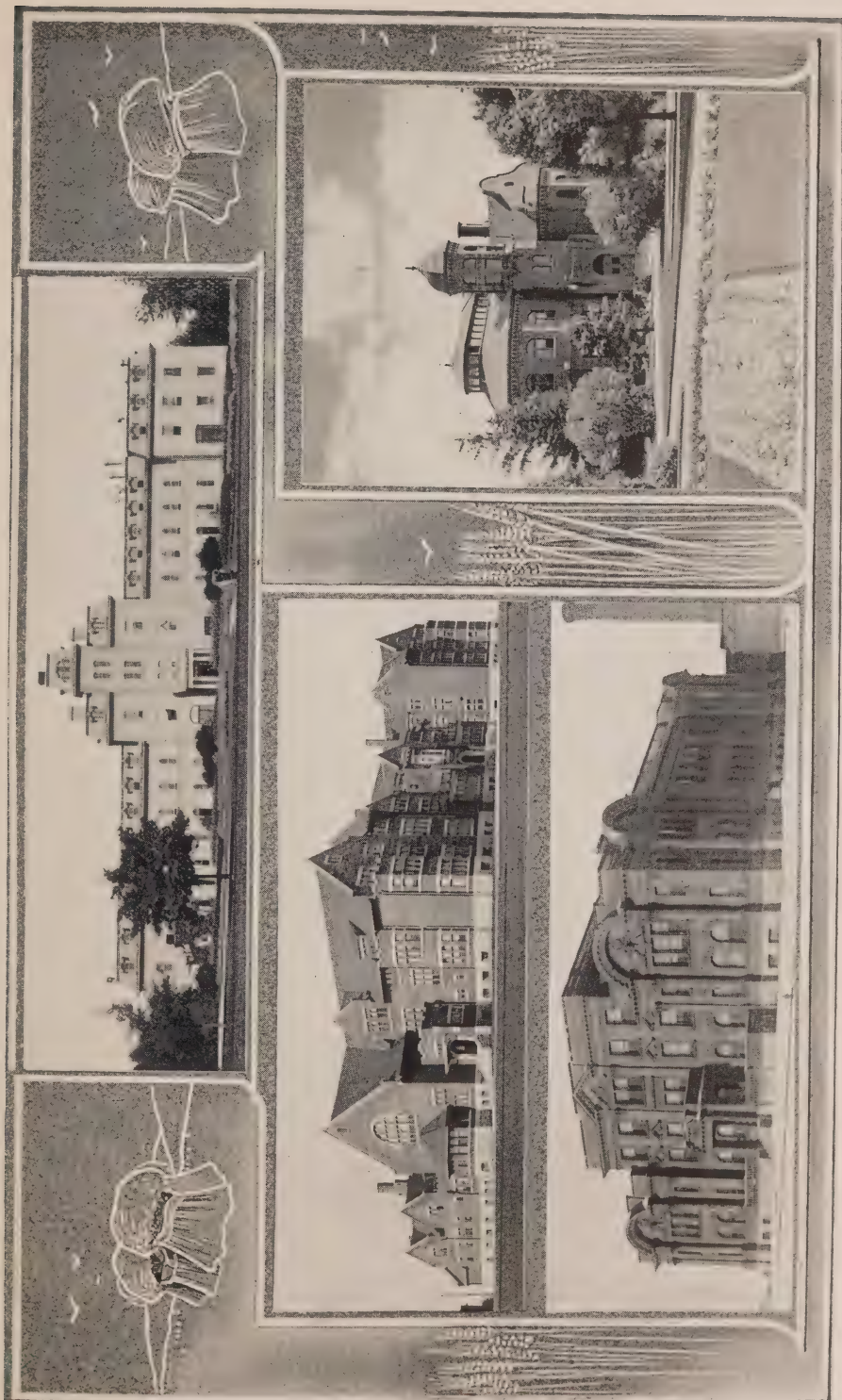
INTRODUCTORY

School curricula, adequate.

Next to the professions, agriculture is best provided for in Ontario; but although the provision for primary and secondary education in the subject is in some respects adequate, in others—and they are the most important ones—it is quite inadequate. In Forms I. to IV. of the Public School Course Nature Study connected with life on the farm is obligatory, and leads up to the Agriculture of Form V., which, for obvious reasons, is optional, just as the obligatory constructive work of Forms I. to III. leads up to the optional manual training of Forms IV. and V. The High School regulations provide for a two years' course in agriculture.

Other conditions unfavorable.

The programmes are adequate, but other conditions are not. In particular the attendance at the rural schools is as irregular as that at the urban schools, and as many drop out of Forms III. and IV. The High School entrance examination dominates the rural school at least as much as it does the urban school, and the other influences that affect those who intend to enter a trade affect equally those who intend to become farmers, with this exception, that even from an early age the farmer's son readily finds employment of a kind that leads directly to his future occupation; the future mechanic does not. Moreover, and this is probably the worst defect, the supply of competent and enthusiastic teachers and other necessary officers is quite inadequate.



ONTARIO AGRICULTURAL COLLEGE, GUELPH

Main Building

Macdonald Hall
Macdonald Institute

Massey Hall and Library

1. IN PRIMARY SCHOOLS

Let me now examine the situation in the Primary Schools. Each Normal School has been furnished with a school garden, and the staffs give the subject as much attention as is practicable; but, owing to the shortness of the session and the pressure of the other subjects, as well as the limitations of the seasons during which each session is held, a complete elementary course cannot be provided. In the yet distant future we may have a two years' session of the Normal Schools. Until then the beginning made at the Normal School must be supplemented from the other opportunities offered by the Departments of Education and Agriculture. For the further instruction of the teachers-in-training a summer school of four weeks' duration was established in 1908 by the Department of Education at the Ontario Agricultural College, Guelph. Here, also, a special three months' course, from Easter to July, is provided by the same Department in agriculture and horticulture for those who are able to pass the Normal School examination at Easter. So far 131 certificates of competency have been issued in this special course.

The Training
of the
Teachers.

As an essential part of the course in nature study and agriculture and horticulture the Department of Education encourages the establishment of school gardens in villages and rural schools by an initial grant of \$50 and a special yearly grant of \$30 to each school board that maintains one, and of \$30 to each duly qualified teacher who takes up the courses. Not many school gardens, it is true, have as yet been established; but, from information I have received in reply to a circular of enquiry, there is reason to hope that, under proper stimulation, the number will rapidly increase. The special obstacles to their satisfactory maintenance appear to be the frequent change of teachers, the pressure of the examination subjects, the interference of the summer vacation, and the lack of teachers—of male teachers in particular—of confidence in the value of school gardens, and of enthusiasm and definite guidance. In many localities the first-named obstacle will probably never disappear; but, in time, it will become less formidable, and, for other reasons also, the importance of the High School entrance examination must be reduced. The lack of male teachers should not, however, be an obstacle. In the United States the woodwork of the elementary manual training course is often taken, and successfully taken, by female teachers. There is nothing in the operations involved in the agricultural course which is beyond the capabilities of ours, especially when aided by the boys of the school. This, indeed, our teachers have already demonstrated. Some years ago many farmers had little confidence in the Ontario Agricultural College; at present they are unanimously in

School
gardens.

Obstacles to
their main-
tenance.

Care during
the Summer.

its favour. As soon as the supply of competent teachers meets the demand, and the value of elementary instruction in practical agriculture and horticulture, even when given by a woman, is generally understood, it is altogether likely that we shall have a similar change of opinion. The interference of the summer vacation is certainly an obstacle, and my correspondents most frequently point this out; but Mr. Cowley, now Inspector of Continuation Schools, who was at one time Inspector of Carleton County, and under whom the school garden system in connection with the scheme of Sir William Macdonald, of Montreal, was very successful, has given me the following statement on the subject:

Example of
Carleton
County.

When the Macdonald School gardens were being introduced in Carleton County, the travelling instructor, Mr. J. W. Gibson, usually spent an hour a week during vacation at each school garden. Each pupil who had charge of a plot was expected to meet him, or, in the event of absence, was held responsible for arranging with some other pupil to tidy up his plot. This plan worked fairly well. In some cases, also, the janitor or some other suitable person was paid a small sum for looking after the plots and walks in a general way. In this case the man in charge gave out the necessary tools from the garden shed to the volunteers among the pupils who attended on a specified day each week to assist in keeping the garden in condition. Mr. Gibson's experience leads him to prefer this as the best all-round arrangement for meeting the summer vacation difficulty. As a rule, the sum of ten dollars will be sufficient to remunerate the man who thus takes charge of the garden of the average rural school. This amount may easily be raised by the sale of produce grown for the purpose on a special plot in the garden. At present one of the Carleton gardens has about two thousand young trees in its forestry plot. From this plot a considerable number of the larger trees have already been sold to residents of the district, and there will apparently be plenty of demand for all the trees that can be grown in the garden.

In connection with the summer vacation problem, it should be noted that, after the garden has been properly cleansed of weeds and weed-seeds, there will be much less need for weeding after June 30th. In some rural districts, too, it would apparently, for other reasons as well, be advantageous to shorten the summer vacation and lengthen the winter one.

Guidance and
stimulation
always neces-
sary.

On the whole, the care of the school garden during the summer presents no difficulty that cannot be effectively met by a level-headed, capable agricultural instructor, in co-operation with interested teachers who have taken the prescribed preparatory course. It seems to me that it will be of great ultimate consequence to put the county agricultural instructor in charge of a headquarters school garden. During the summer vacation he could visit the gardens at short intervals until they become too numerous. When that stage is reached the public opinion of each section will look after its garden.

But in educational matters prejudice and apathy die hard; expert guidance and continued stimulation are always necessary. Some of the county inspectors and the county representatives of the Department of Agriculture are now attempting to perform this important duty; but the time of the latter is in most cases already taxed, and few of the inspectors possess the necessary knowledge. For the latter, as soon as the reorganization of this branch of the

service is completed, attendance at a summer school at the Ontario Agricultural College should be prescribed; and, to begin with, one special departmental officer should be placed in charge of the county work in co-operation with the inspectors and the representatives. The duty of stimulating and directing school garden operations is a most important one. If enthusiastically performed, not only would it make real the instruction in agriculture in the Public Schools, but it would bear fruit in a larger attendance in the agricultural departments of the High Schools. One thing is certain, if agricultural education is to become efficient the work of reform must be carried on chiefly in the Public Schools. In the case of the industries I have pointed out the necessity for courses in manual training in Forms I.-IV. as a basis for the trades. In the case of agriculture it is equally important that in Forms I. to IV. of the rural public schools nature study and the associated school garden should receive attention.

Summer
School for
Inspectors.

A Director of
Elementary
Agricultural
Education.

2. IN SECONDARY SCHOOLS

The programme of the High and Continuation Schools includes courses in agriculture and horticulture. Since 1907 each year has seen the appointment of three or four graduates of the Ontario Agricultural College to take charge of these courses, and to act also as county representatives of the Department of Agriculture. At present such provision has been made in connection with the Continuation School at Carp, the High Schools at Essex, Norwood, Petrolea, Port Hope, Simcoe, and Stirling; and the Collegiate Institutes at Collingwood, Galt, Lindsay, Morrisburg, Perth, Picton, and Whitby; and there can be little doubt that in due course the other counties of the Province will be similarly officered.

Provision for
Secondary
Courses.

As to the attendance in the Secondary Schools: So far the courses have been taken by few; in some localities, indeed, by none. From the evidence submitted in my correspondence it would appear that in most cases the farmer who now sends his son or his daughter to the school to prepare for a teacher's certificate or for matriculation, is sending as many of his family as he can spare. Moreover, he must be thoroughly convinced of the value of the agricultural course before he will substitute one of them for the teachers' course, which produces ready returns, or for the university course, which gratifies his ambition. The agricultural department has this disadvantage also. The farmer's son who secures admission to the university or the normal school may then return to the farm, or he may enter the Agricultural College at Guelph. If he takes the High School agricultural course it will admit him only to the second year of the course at the College—an inducement which

Attendance
poor.
Causes.

Reorganiza-
tion necessary.

Present organ-
ization only
temporary.

Functions.

Agricultural
Departments
of secondary
grade.

Evening
classes.

three years' trial has shown to have no practical value. Besides, the other examinations are the object of the teacher's ambition; the agricultural examination is not. The conclusion of the matter appears to be this: For the present the two years' courses now prescribed are too ambitious for most of the schools, and it would be better to develop either individually or in a series the short courses which have already been carried on successfully in nearly all. Moreover, as I have proposed in the case of the trade industrial classes, it will no doubt be found necessary for a time to admit to the short courses pupils who have not passed the High School entrance examination, but who, in the opinion of the teacher of agriculture and of the principal of the Public School or Separate School, are able to take up the work. It appears to be clear, also, that the absence or the smallness of the High School classes cannot be justly laid at the door of the agricultural teacher. With few exceptions, the principals of the High Schools report favourably of his attitude on this question; and it is reasonable to suppose that, under suitable conditions, he would be as successful in this branch of his duties as he has undoubtedly been in the others. True, these men have had no pedagogical training; but, if we insisted on such training at present, we should not be able to secure teachers with the necessary expert qualifications. Besides, the intensely practical nature of the greater part of the courses makes this defect less important. The present combination of two functions in one officer is, however, still in the initial stage. In some cases, the representative of the Agricultural Department does not realize that, as matters now stand, he is responsible to the School Board also. After a few years, it will no doubt be found desirable to separate the functions, and to hand over the teaching function to graduates who have taken, at the University, a two years' course in science, and, at the Ontario Agricultural College, a two years' course in agriculture; and who have, besides, the professional training we now impose upon all our other teachers. In the meantime, however, the present officers can do much to prepare the way for an efficient system of primary and secondary education in agriculture. In the meantime also the responsibility of these officers must be clearly defined.

The next step in the development of agricultural education would be the establishment of well-organized agricultural departments in the High Schools and of Agricultural Continuation Schools. At present, with the exception of the Guelph Consolidated School, where classes are maintained in agriculture and domestic science, the Continuation Schools are simply High Schools in miniature, and, like the High Schools, they aim chiefly at the preparation

of candidates for the departmental and university examinations. As my report has shown, England, France, Switzerland, and Germany provide continuation agricultural classes, held chiefly in the evening. These, however, are the products of old and populous countries. Their forerunner in Ontario will be the Consolidated School; but this, unfortunately, is now no nearer realization than it was when first talked of over ten years ago. The last step in the development of secondary agricultural education will be the establishment of separate high schools, somewhat of the character of the Wisconsin County Schools of Agriculture, of which there are now ten. By correspondence with the Principal I have obtained particulars in regard to the school at Menominee, in that State.

Agricultural
High Schools.

Wisconsin
State Law.

**The Dunn County School of Agriculture and Domestic Science,
Menominee, Wis.**

The Wisconsin State law provides that any county may, through its county board, establish a county agricultural school. A site for all the necessary buildings must be provided, together with a specified amount of land, which, in the opinion of the Principal, should not be less than 160 acres. The State provides two-thirds of the money necessary for maintenance, provided, however, that it is not obliged to pay more than \$4,000 in any year to any school. It is expected, however, that at the next meeting of the Legislature this amount will be raised to \$6,000. These schools are really high schools.

Establish-
ment and
maintenance.

As to the present accommodations of the Menominee School: One large brick building has been set aside for general agricultural work, as well as the shops where instruction is given in blacksmithing, woodworking, and machinery. The commercial creamery and the chemical and natural science laboratories are also in separate buildings. At present the stock consists of twelve milch cows. There are also a silo and the other equipment necessary for the courses. The students take care of the cattle, under the supervision of a competent instructor. The poultry department accommodates one hundred fowl. The work of the institution is conducted not from an experimental standpoint, but rather for demonstration.

Accommoda-
tions and
equipment.

Pupils are admitted when 16, directly from the rural schools; but, by special arrangement, any student may be admitted, even though he may not have completed the rural school course. There are no fees except a small charge for the classes in chemistry, gasoline engines, and farm machinery. Text books are provided by the school, and pupils pay 25 cents a month for their use. Many pupils, mostly young men, have found it possible to pay their way while attending the school by various kinds of manual labour. The

Admission
tests.

Fees.

course of study is a two years' one, some subjects being taken by the men and women together and others separately.

Departments. There are five departments, with their subjects as follows:

1. *Field Agriculture and Natural Science*: Farm management: Care of crops, systems of rotation, introduction of better seeds and better methods, the economic aspects of farm life. Elementary principles in applied chemistry, botany, entomology, etc.

2. *Animal Husbandry*: Dairy husbandry, foods and feeding, stock judging, types of farm animals, veterinary farm practice, and poultry.

3. *Domestic Science*: Household chemistry, food study, cooking, household physics, household bacteriology, food adulteration, household management, home nursing, sewing, millinery, house decoration, art needle work, textiles, and laundry.

4. *Agricultural Engineering*: The essentials underlying constructive and repair work and working principles of construction of machinery for farm power and field work, woodworking, forging, drawing, concrete construction, gasoline engines, field machinery, spraying, applied mathematics.

5. *Academic*: Civics, history, physiology, English, book-keeping, theme-writing, reading, and elementary mathematics.

3. THE COUNTY REPRESENTATIVES OF THE DEPARTMENT OF AGRICULTURE

Experiment
successful.

But, although as teachers of agriculture in our High and Continuation Schools, success has so far not followed the footsteps of the County Representatives of the Department of Agriculture, there can be no doubt whatever that, in the latter capacity, they have been eminently successful. The regulations direct that they shall bring the Department of Agriculture "into close touch with the farming community, and make it more directly beneficial to them." This the county representatives have undoubtedly done.

During the past year I have received reports from the Secondary School principals of the work done both at their schools and throughout the counties. I cannot exemplify the character of the latter better than by citing the report for 1909-1910 of the representative for the County of Waterloo, whose zeal and competency the Principal of the Galt Institute commends in high terms. I have pleasure in adding that what the Waterloo representative has done most of the others have also done:

Farmers'
Clubs.

We have about twelve farmers' clubs in operation in the county, meeting during the winter once or twice a month. These meetings are of an educational nature, and are addressed by the members themselves, with an occasional outside speaker on the programme. The clubs afford opportunities for public speaking, for acquiring the benefit of the experience of other farmers in the community. They act also as social centres for the district, neighbours become better acquainted, and in many ways these clubs are proving very beneficial. Different schemes have been initiated in various clubs. One has been instrumental in getting a rural telephone system among the farmers and in starting a successful continuation class in the village school. Another has revived the plowing match and instituted an annual neighbourhood banquet. Others have

various co-operative schemes. Each club is working out plans for the betterment of its members. Of course, I attend as many meetings as possible, but as they are all held in the evenings, and are in different parts of the county, at times it means considerable travelling and driving at late hours, which makes it impossible for me to attend all. However, each club secretary sends me a full report of each meeting, together with copies of some of the papers read and a synopsis of the discussions. Consequently, I keep in close touch with all the clubs over the county. We have used some of these reports and papers for full page accounts of the various meetings in our local weekly papers, copies of which were sent to each member in all the clubs. We are holding a conference of the officers of these clubs in the near future, in order that they may be mutually helpful. Preparation is also being made for the organization of more clubs.

The short courses have been of two or three days' duration, and for the purpose of a practical study of live stock and seeds. I have been favoured with the services of the professors of the Ontario Agricultural College for this work. These courses have been held at Ayr, Galt, and Elmira. The average attendance at each has been between 300 and 400 farmers. We have used the best stock obtainable, and have had as teachers the highest authorities; so that these courses are of immense value in advancing agricultural education at home. And just here is an excellent sample of the value of the farmers' clubs. In the necessary preparation work for these courses, such as obtaining stock, buildings, advertising, etc., the organized clubs have been the main feature, and have, in a large measure, insured success.

Practical demonstrations in caring for orchards have been held. Parts of orchards in various sections of the county have been sprayed and results noted by the owners. At some of these sprayings the men of the neighbourhood were invited to be present, and explanations were given as to the methods and reasons for the different sprayings. The subject of farm weeds was also discussed, with the actual weeds of the district from the fields for illustration purposes.

We have had about 30 experiments on farms in different parts of the county in order to determine the value of the fertilizers for certain purposes. These experiments consisted of applying the different fertilizers in various combinations and with various crops, both on muck soils and on typical fields of the farm. The material has been prepared for the experimenter and directions given, so that we have had very little difficulty in getting good results from the men who have co-operated with us. Of course, these experimental plots were visited some time during the season.

During the last two years we have had three of the rural schools near Galt unite in a competition in growing farm crops and in making nature collections. This year we have had six of the rural schools near Ayr doing the same work. In the three schools near Galt a choice of a larger number of crops was given, and each pupil was allowed to grow two. The results were exhibited at what we called a Rural School Fall Fair. In connection with this work I believe some of the best educational activities for young boys and girls on the farm have resulted, but they must be seen to be fully appreciated. As far as possible, the pupils' plots at their homes were visited during the summer.

In driving about the county I sometimes take the opportunity of visiting the rural schools and addressing the pupils. I have also helped some of the teachers in connection with their rural school gardens and nature study.

Two years ago we took about 1,000 pupils on an excursion to the Ontario Agricultural College. We are seeing results of the excursion to-day.

Each year I have been on the programme of all the Farmers' Institutes meetings in both the north and the south ridings. During the winter practically one month has been spent at these meetings. We have induced many pupils each year to visit the Agricultural College at the time of the annual Institute excursion.

Farmers' Institutes.

The Agricultural Society has given me large latitude in connection with certain features of the fall fair, and particularly in the pupils' department, which is now exceptionally educative not only for the boys and girls exhibiting, but for the public as well. Under the head of Nature Study, prizes are offered both Public and High School pupils for collections of wild flowers, weeds, grasses, grains, and clover, injurious insects, beneficial insects, photographs of natural objects and scenery, an essay on farm weeds. Prizes are offered rural pupils for Swede turnips feeding sugar beets, pumpkins, etc. Prizes are also offered for the products of their work in sewing, cooking, ironing, and manual training.

Fall Fairs.

In connection with the fall fairs we have also had exhibits of our own, such as would be helpful for farmers seeking information. We have also held successful stock judging competitions for boys in connection with the fair. Our experimental plots are in the fair grounds. I have also had the opportunity of delivering addresses at the seed fairs of the Agricultural Society.

Other work.

Besides the above there is much detail work of a more general nature, such as preparation of addresses for meetings, articles for the press, assisting the different farmers' clubs in their various activities, aiding the women's institutes, horticultural societies, poultry associations, etc. The office is used as the board room for these societies. I have addressed the Teachers' County Convention, acted as judge in the Standing Field Crops Competition, and have endeavoured to be of assistance to all organizations connected with the rural communities. Mention should also be made of the individual assistance given to numerous farmers, both in the office and in going through the country.

In giving you a list of my activities at any time it is not possible to state the preparations of plans for the future. Much of our work is simply a part of a larger plan that can be reported on only when completed.

All of the above together with other things that I may have omitted to mention is, as you are aware, entirely outside of my connection with the Collegiate Institute.

Local co-operation.

The foregoing is but the briefest statement of some of the things we have been engaged in. It is enough to show, perhaps, that, as local representatives, there are many fields of work open to us. I should add that, since being placed in Waterloo County, I have had the hearty and helpful co-operation of all with whom I have been associated, without which, indeed, results would not have been so promising.

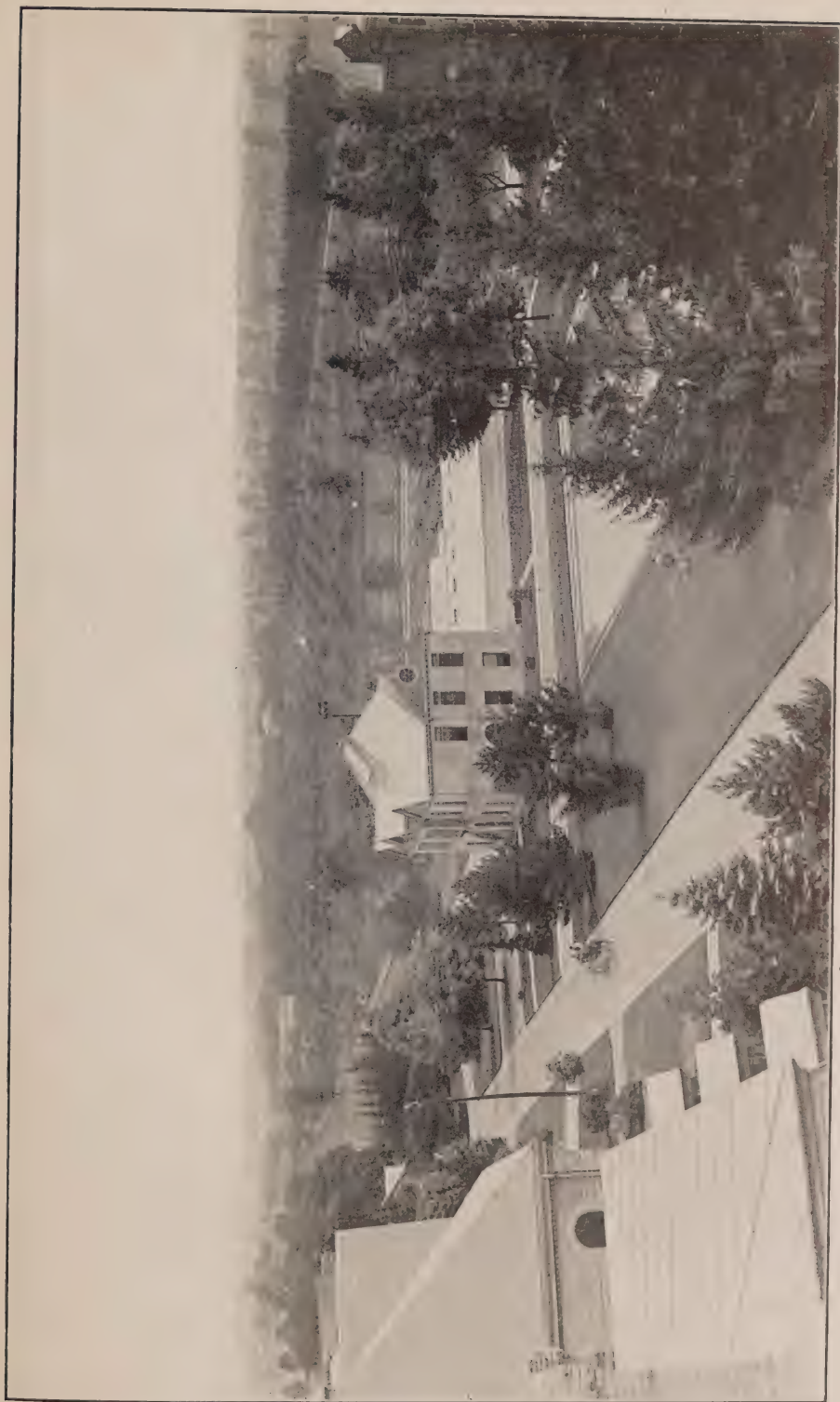
Short Courses at High Schools.

The Principal of the Collegiate Institute informs me that a short course of about six weeks will be given farmers' sons during the coming winter, using in the work the agricultural class-room and apparatus. Some of the pupils in the Collegiate Institute are now taking agriculture in addition to their other courses, and last year a number took the agricultural course alone. Here I may point out that it is well worth considering whether, if the bonus system is retained, it would not be in the interests of education to recognize also as bonus subjects, at the Normal School entrance examinations, suitable courses in agriculture, household science, manual training, and art, as well as Latin. The proposal has much to commend it.

Options at Normal School entrance examinations.

Necessity for courses at Primary and Secondary Schools.

What these officers are doing is, of course, exceedingly valuable as industrial training; but the organization of our educational system will not be adequate until we have established successful classes in agriculture and horticulture in our Public, High, and Continuation Schools, with, eventually, separate Agricultural High Schools.



ONTARIO AGRICULTURAL COLLEGE, GUELPH
The Horticultural Building with the Gardens and Orchards

What Wisconsin has done surely Ontario can also do. Here I may add that the Director I propose in connection with the school gardens and elementary instruction in agriculture should also act as Director of the agricultural classes in the High Schools until the work reaches a more advanced stage. In this connection I desire to express most emphatically the opinion that, if we miss the present opportunity of taking a further step in the development of an efficient system of agricultural education, it will be exceedingly difficult to rectify our blunder in the near future.

Departmental direction.

A critical juncture.

4. THE ONTARIO AGRICULTURAL COLLEGE, GUELPH.

At the head of the agricultural branch of our industrial system stands the Ontario Agricultural College, at Guelph. As I have already reported, I had no time to visit any of the other agricultural schools during my tour. I found, however, that, in Europe and the United States, provision is generally made for all stages and all departments of agricultural education. I found, also, that the Ontario Agricultural College is widely known, and everywhere regarded as a most effective institution.

Efficiency of the college.

The College is affiliated with the University of Toronto. Its regular four years' courses lead to the university degree of B.S.A. They are technical in the limited sense of the term, and prepare men for professorships or lectureships in colleges and directing positions in connection with agriculture as well as for actual farming itself. The graduates, however, are but a small proportion each year of the student body. The first two years lead also directly to the farm; that is, more than half of the attendance take a diploma, from 50 per cent. to 70 per cent. returning to the farm and the rest going on for the degree.

Technical courses for degrees.

Industrial courses for diplomas.

In winter short courses of from two to four weeks' duration are held at the College for mature farmers in stock judging, seed judging, poultry culture, fruit growing, and butter and cheese making. The aggregate attendance at these courses reaches more than 500 a year. The agricultural teachers in the High Schools also conduct two and three day short courses in stock and seed judging at different points in their counties at which College professors are present and assist in the practical demonstrations. Manifestly the two years' courses and the short course are industrial, although not actually so denominated.

Winter short courses.

Besides giving valuable assistance in the reforestation of the Province and supplying the farmers with the products of the bacteriological laboratory, the College discharges the following func-

Other forms of Industrial Training. tions, which are, of course, most useful forms of industrial training:

Agricultural and Experimental Union; Farm divisions.

Schools' division.

In its Ontario Agricultural and Experimental Union there are 5,500 farmers, conducting experiments on their own farms and reporting to the College once a year. Through this organization the best varieties of field crops have been introduced into the different communities with surprising results. In the schools' division of the Union correspondence is carried on with teachers and trustees in regard to material supplied through the College for school gardening and the improvement of school grounds and buildings, such as vines, shrubs, flower and vegetable seeds, grains, forest-tree seedlings. It advises in regard to agricultural text-books, and provides the College paper for the school library and a picture of the College for framing as a wall decoration. It also conducts correspondence in regard to methods of instruction, plans for gardening, laying out school grounds, and in general the teaching of elementary agriculture and horticulture in the schools. In 1910 more than 400 Public School teachers were engaged in this work. The College also issues monthly the "Schools' and Teachers' Bulletin," which is "devoted to those interests of the Ontario Agricultural College which pertain particularly to the training of teachers, for giving instruction in the schools of the province along vocational lines, home economics, industrial arts, and elementary agriculture and horticulture."

Visiting the farmers.

Each year College professors attend public meetings in the rural districts, deliver addresses at farmers' institutes, and give practical demonstrations on improved methods of farming. From these professors the farmers learn what has been done on the College farm. The result is that in the month of June, each year, between 30,000 and 40,000 farmers visit the College and go over the farm, under the guidance of the staff, noting the experiments, the crops, the breeds of animals, methods of cultivation, etc.

Summer work by undergraduates.

Undergraduates of the College are engaged each summer to visit individual farmers and survey their farms for tile drainage. During the summer of 1910 ten such men have been employed, going constantly from farm to farm with surveyors' instruments. The result is that nearly 100,000 acres have been drained in this way in the past four years.

Travelling dairies.

The College sends out travelling dairies and holds butter-making demonstrations in the township halls, school-houses, on the four corners, and wherever it is practicable to get farmers and farmers' wives to meet. As a result, in this Province good butter is now the rule and poor butter the exception.

By means of the staff of the department of Pomology, pruning, spraying, and thinning demonstrations are held throughout the Province.

All the work described above has proved of such interest to the farmers that it is necessary to keep a large staff of stenographers, and the professors are occupied a good deal of their time, when not engaged in teaching and experimental work, in conducting "a Correspondence-Study School" with the farmers all over the country in regard to farm crops, farm management, and better methods. Moreover, each department publishes general and special bulletins on its own particular work. This, with the travelling professors, is the counterpart of the Correspondence-Study School I propose as one of the functions of the Ontario Industrial and Technical College.

In addition to the foregoing work the College conducts in connection with the Department of Education, as I have already pointed out, summer classes for teachers in nature study, elementary agriculture and horticulture, art, constructive work, wood-work, metal work, mechanical drawing, and household science. From Easter until the end of June it also maintains more advanced courses for teachers in elementary agriculture and horticulture and the elementary industrial arts.

5. OTHER PROVISIONS FOR AGRICULTURAL EDUCATION

Besides the Ontario Agricultural College the Province maintains a Faculty of Forestry in the University of Toronto, with a staff of one professor, two lecturers, and one instructor, at an annual cost of nearly \$10,000; and, as I have already mentioned, the Dominion Government maintains a system of Experimental Farms. The latter does no instructional work, but from time to time communicates the results of the experiments to the farmers and once a year makes a report to Parliament. All this experimental work, but on a smaller scale, the Ontario Agricultural College does for Ontario, in addition to the instructional and other activities which I have described above.

IV. COMMERCIAL EDUCATION

INTRODUCTORY

About twenty-five years ago many business men—some, indeed, even now—both in Ontario and elsewhere, took the ground that a boy cannot be educated for business, that it can be learned only in the office or the warehouse. This opinion is based on the erroneous assumption that the advocates of commercial education claim that, immediately after his preparation, the student will be at once as useful to his employer as if he had spent the time in a business office.

The situation in this case is, however, the same as that in the industries. A trade school does not produce an efficient mechanic; it merely gives him the training which enables him to become an efficient one after proper experience. So too, in the case of the Commercial student.

1. PROVISION—ENGLAND AND FOREIGN COUNTRIES

England.

In England, at present, the organization of commercial education is exciting great interest; but, owing to the decentralization of the system of education, the courses are marked by great variety. In England also, as in the United States and Ontario, there are many so-called Business Colleges conducted for private profit, and supported because their organization is more elastic than that of the public schools, and from its conditions offers a shorter road to wage-earning employment. Some of these schools give a good training, but most of them are of a low grade. Besides commercial education of the primary and secondary standard, the nature of which in some centres I have already indicated in my report, England has provided in universities and university colleges courses in economics and commercial subjects. Of these, the chief are the University of Cambridge; the London School of Economics and Political Science, and University and King's Colleges (University of London); the Universities of Birmingham and Liverpool; and University College, Reading.

Germany.

As my report has also shown, commercial education is amply provided for in the other countries I visited. In Germany, many of the schools of commerce exist as departments of technical schools and colleges. They exist also as separate institutions, and several of the higher ones are attached to universities. The first commercial high school was founded by the Leipzig Chamber of Commerce in co-operation with the University of Leipzig in 1898. Since then many schools modelled on it, have been established in various parts of the Empire. Here, I may note, that these schools in particular are equipped for practical teaching. They have libraries, stereopticons, and museums in connection with the geography and the natural products course, as well as laboratories for physics and chemistry, where the students are trained in the chemical, mechanical, and microscopic examination of merchandise, for the detection of fraud and adulteration. The students are also taken to works, factories, business offices, and other places from which they are likely to derive advantage.

Switzerland.

In Switzerland, there are commercial schools of all grades. The system provides instruction in the elementary and secondary schools and in the highest institutions, from which, under travelling scholar-

ships, the best of the students are sent abroad for one or two years to complete their studies.

The French merchants set great store by commercial education. France. With them, the question of distribution is not less important than that of production. As my report shows, the State Chamber of Commerce and other commercial bodies have established Schools of Commerce in the business centres, the expense of which is borne by the State and the municipality, by the Chamber of Commerce, by merchants, and by school fees. Here, also, the school museum shows, by means of samples and specimens, all kinds of productions in their natural or raw state, as well as the phases through which they pass from the raw to the manufactured condition. These museums are regarded as essential. They are, however, usually presented by merchants or manufacturers, and very seldom is a school obliged to make purchases for them.

Besides the provision for elementary commercial education in United States. the United States, there are also special Commercial High Schools in the larger cities with excellent staffs, accommodations, and equipment. The one at Boston, I have already described. Many of the universities have also provided graduating departments. Of these, the chief are the Graduates' School of Business Administration at Harvard and at Dartmouth College, the College of Commerce and Business Administration at Chicago, the Wharton School of Finance and Commerce at Pennsylvania, the School of Commerce at Wisconsin, the College of Commerce at the University of California, and the University of New York. In the Universities of Michigan, Illinois, and Vermont, there are no separate commercial departments, but, as in the University of Toronto, the work constitutes a division of the Arts Department and the degree is that of B.A. In the others, the commercial departments are separate, with special certificates and degrees. The courses at the University of New York are especially practical.

2. PROVISION IN ONTARIO

INTRODUCTORY

So much for the situation in other countries. Before discussing Dominion trade returns. the provision for commercial education in Ontario, it is important to ascertain at least in a general way the extent of the trade relations. For Ontario alone, the available statistics do not enable me to give a separate report. The following statement taken from the Dominion Trade Returns for 1909 to 1910, will give an idea of the situation, in view of the large part Ontario plays in the importation of foreign products and the distribution of her own.

The following are the names of the different countries from which Canada imported goods for home consumption or to which she exported goods of home production:

Trade
relations.

British Empire: United Kingdom, Bermuda, British Africa, British Australasia, Australia New Zealand, British East Indies, British Guiana, British West Indies, Fiji, Hong Kong, Newfoundland.

Foreign Countries: Arabia, Argentine Republic, Austro-Hungary, Belgium, Brazil, Central American States, Chili, China, Cuba, Denmark, Danish West Indies, Dutch East Indies, Dutch West Indies, Ecuador, Egypt, France, French Africa, French West Indies, Germany, Greece, Hawaii, Hayti, Holland, Italy, Japan, Mexico, Norway and Sweden, Panama, Persia, Peru, Philippines, Porto Rico, Portugal, Russia, St. Pierre, Spain, Spanish Africa, Switzerland, Turkey, United States, United States of Columbia, Uruguay, Venezuela.

Value of
imports
and exports.

The total value of the imports for Home consumption from the above, amounted to \$298,205,957.00, and of the exports to \$242,603,584.00. The classes of exports are set forth under the following heads:

| | |
|----------------------------------|------------------|
| The Mines | \$ 37,257,699 00 |
| The Fisheries | 13,319,664 00 |
| The Forest | 39,667,387 00 |
| Animals and their products | 51,349,646 00 |
| Agricultural products | 71,997,207 00 |
| Manufactures | 28,957,050 00 |
| Miscellaneous | 54,931 00 |

\$242,603,584 00

Attitude of
educationists
towards
commercial
education.

Another matter: About twenty-five years ago, so deeply embedded in the mind of our educationists was the cultural theory of education, that little provision was then made even for book-keeping, not to speak of the other subjects of a commercial course. During the last fifteen years, however, the importance of the commercial department has grown with the efficiency of the schools, the increase of business, and the adoption of better methods of transacting it. The cheapness of the equipment and the comparative ease with which students of the course can qualify themselves for wage-earning positions have conduced to the same end. Moreover, as the subjects of a commercial course are practical, many parents believe that if their children take them at school they will be in a better position to earn a livelihood.

(I) SCHOOL ATTENDANCE

The following table shows the attendance in the different classes of schools. It must be remembered, however, that the large number taking book-keeping alone, is due chiefly to the fact that the subject is obligatory for teachers' academic certificates, and is by many regarded as an essential part of a general education:

| | In Book-keep- ing but not a Commercial Course. | In a Commer- cial Course, more or less complete. |
|---|---|---|
| Public Schools (number of pupils in 4th and 5th Forms, exclusive of Continuation Schools: 88664) | 4904 | 6268 |
| R. C. Separate Schools (Number of pupils in 4th and 5th Forms, exclusive of Continuation Schools: 9177) | 33 | 1445 |
| Continuation Schools (Number of pupils in Lower School: 3955) | 2209 | 45 |
| High Schools and Collegiate Institutes (number of pupils in Lower School: 20644) | 12370 | 2864 |

(2) ORGANIZATION OF COURSES

After a conference in 1901 with representatives of the Manufacturers Association and the Board of Trade, the Senate of the University of Toronto established a diploma in Commerce. The provision, however, proved to be ineffective, chiefly because it did not lead to a degree. As a result, after further consultation with business men, a new course was established about two years ago as one of the departments of the Arts Faculty. This course is known as that of Commerce and Finance and leads to the degree of B.A. Last session, a considerable number of students took the first year. Of these, sixteen secured standing, of whom the greater number are now proceeding to the second year. In addition, a very fair number, I understand, have entered the first year this session. In this department the work of the first and second years is taken at the University and is the same as the Arts Course, except for Accounting. In the third and fourth years, the co-operative plan has been adopted. The student engages in actual business and takes at the University the special commercial subjects dealing with banking, finance, transportation, insurance, and trade and industry. This curriculum is, of course, intended for the highest grade of commercial students, not for those who fill subordinate positions.

The Hamilton, Toronto, and Ottawa Public Schools have 5th Form Commercial Courses, the Hamilton one being for three years and the others for two. In the other Public Schools and in the Separate Schools, however, the book-keeping or commercial subjects are simply additions to the subjects of the General Course. In sixteen of the High Schools, book-keeping is taught. Two years' commercial courses more or less complete and organized in many cases as separate departments, have been provided in forty-five of the one hundred and forty-six High Schools and Collegiate In-

Provision for
Commercial
Education
at the
University
of Toronto.

At the
Elementary
Schools.

High Schools. substitutes. The Brantford, Chatham, Ottawa, and St. Thomas Collegiate Institutes, and the Toronto Technical High School have three years' courses and separate departments. The other High Schools provide commercial courses more or less complete. At present, however, almost the only products of our commercial departments are stenographers, typewriters, and book-keepers. In most cases, however, the supply probably meets the present demand in both quantity and quality.

(3) PROPOSED COMMERCIAL COURSES FOR SECONDARY SCHOOLS

In order to put into definite shape the results of my investigation of the most effective commercial curricula, I submit two courses, the General Business and the Office Course, which might readily be carried out in our large cities:

General
Business
Course.

The General Business Course is intended for those about to enter business life in some of the more responsible positions, eventually becoming travellers, buyers, managers, etc. This course should extend over a period of four years:

1. *Language*: English—Composition, correspondence, and literature; French and German—Conversation and correspondence..
2. *Accounting and Business Practice*: Penmanship, bookkeeping and the principles of accounting; laws of business, business forms and documents; business practice.
3. *Mathematics*: Arithmetic and algebra applied to commerce; foreign tariffs, weights, measures, moneys, and exchanges.
4. *Study of Materials*: Commercial, industrial and statistical geography, including markets, exporting and importing, trade customs and transportation; commercial and industrial history; knowledge of products and industries.
5. *Principles of Commerce*: Economics and statistics; banking and currency.
6. *Optional Subjects*: Shorthand, typewriting and drawing.

Office
Courses.

The Office Courses are for those intending to enter business life as book-keepers, accountants, stenographers, secretaries, etc., and should extend over a period of three years:

1. *Accountancy Course*: Subjects of the first two years of the General Business Course; shorthand and typewriting to be compulsory. Special stress in the third year on mathematics and accounting.
2. *Shorthand Course*: Subjects of the first two years of the general Business Course, shorthand and typewriting to be compulsory. Special stress in the third year on shorthand and typewriting.

Boston
High School
of Commerce

Co operation
with Business
Houses.

In this connection I direct attention to the organization of the Boston High School of Commerce. As there, it might be practicable in some cities here, for school boards to arrange for co-operation, during the summer at any rate, with some of the best business houses. The fictitious business departments of the Business College have not been found to be of much value for educational purposes.

Many of the best of these colleges, I am told, have given up this part of their equipment.

My remarks so far have had in view the requirements of our ordinary day schools. To most of those who are engaged in business by day and whose means have not allowed them to utilize, before entering on business, the opportunities of the day school, the evening school should be available. The organization of such schools in some of the chief cities of the old world, as part of their provision for vocational training, I have already dealt with.

Evening
Schools.

The foregoing and the other similar proposals in this report assume a change in relation of the schools to the public; but, if the schools are to prepare pupils for the duties of the future, the proposals, though novel, cannot be regarded as unreasonable. In many respect our schools have hitherto been too far removed from the activities of life.

Connection
between our
schools and
the activities
of life.

(4) QUALIFICATIONS OF TEACHERS

As to the qualifications of our teachers: Book-keeping and commercial transactions are a part of the courses for all grades of public school teachers, and our collegiate institutes are required to employ commercial specialists who have taken an examination that means practically two years' preparation. To obtain their interim certificates, the latter are not now required to have had experience in business, although a good many have obtained some such experience during the summer vacations. In view of the requirements in the case of agricultural and industrial education, it appears reasonable to expect that at least before an interim certificate becomes a permanent one, the commercial specialist should have had some such experience. If, also, concurrent practice could be obtained while they are preparing for their interim certificates, it would be greatly to be desired. It does not appear to be logical to place under teachers who have never had any business experience the education of those intended for a business career.

Necessity
for business
practice.

At present, the Department of Education makes no provision for the training of commercial specialists. Either they study the course without assistance or they attend one of the business colleges for a few months. Manifestly, to complete our system of professional training, the Department should provide them with a preparatory course. The University supplies us with specialists in the academic subjects, including Household Science. As it has already provided a Department of Commerce, it may be that by a system of options in the first two years, it could supply us with commercial specialists; a diploma being given to those who complete a two years' course and a degree to those who take a four years' course. Suitable op-

Proposed
provision for
preparatory
courses.

tions might, of course, be provided, instead of some of the languages and other academic subjects that do not bear directly upon commerce; and, for such students, at any rate, a Department might be constituted apart from that for B.A., as I have already shown, is now done in some other Universities. As an alternative, an arrangement might be made with the Board of Education of the City of Toronto, which is about to establish a High School of Commerce. As now in the case of Art, a summer school, I may add, is feasible for those who have not the means to take a continuous course.

V. GENERAL CONSIDERATIONS

I. SOURCES OF FINANCIAL SUPPORT

Cost of
Education
for Industrial
Purposes.

In most respects the cost of commercial education need not be great. Suitable equipment and accommodations are within the reach of most localities and the salaries that are paid in the academic departments will secure an adequate supply of competent teachers. But it is different in industrial and agricultural education. The equipment and accommodations for both—especially for the former—are exceptionally costly; exceptionally large salaries must be paid for specially trained teachers, and the materials for the work-shop and the stock and supplies for the farm will be a continual source of expense. If, however, Ontario is to become a great manufacturing as well as a great agricultural Province, there is no escape from this expenditure.

Sources of
support.

The sources of financial support available at present are fees, local rates, and Legislative grants.

Fees.

As to fees: Their imposition should, as at present, be a matter entirely within the control of the school board. The day classes would naturally be dealt with as are the academic day classes of the same locality. But much can be said in favour of charging fees for evening classes, part or all being returnable on condition of regular attendance and of satisfactory progress. All the evidence I gathered in Europe favours the imposition of such fees. There it improves the regularity of attendance and stimulates the zeal of the pupils. Under the most favourable conditions, however, the income from fees would form but a small part of the necessary income.

Local rates.

As to local rates: The aggregate municipal and county tax for the schools of the Province is already large; but, as the localities in which the industrial and agricultural schools are situated will reap the chief benefit from their establishment, it is only right that the municipalities concerned should contribute to the cost. Already, indeed, where schools take up industrial work, they share

in the educational rates of the municipalities, and the High and Continuation Schools Acts of 1909, provide for a special county grant of \$500 for the support of the agricultural department, from which, however, the farmer, not the school boy, derives most benefit at present.

As my report has already shown, the various governments of Europe assist in the establishment and maintenance of their industrial, agricultural, and art schools; and, in the United States, notwithstanding the democratic doctrine of independent local control, State after State is now following the example of Europe. That the Province of Ontario will also aid to the utmost of its ability industrial, agricultural, and art education there can be no room for doubt. Hitherto agriculture has been and, indeed, it still is the leading occupation of the people. Of late years, however, the industries have come to the front and it is reasonable to expect that their interests will hereafter also receive due consideration.

In Great Britain and in many of the countries of the Continent, the industrial and technical schools, as my report has shown, are aided with both money and equipment by the Guilds and similar societies. In our new country, there are no Guilds; but the Manufacturers' Associations and Boards of Trade, which are their modern representatives and which have shown special interest in the question of industrial education, not to speak of individual manufacturers and merchants, might well give countenance and similar aid to the schools in their localities.

At this stage in my investigation, it is desirable to set forth what the Legislature of the Province has already done to aid the various branches of training dealt with in my report. The following statement gives for the year 1909-10 the main details of the Legislative grants for the various branches of technical, industrial, agricultural, and art education, and for manual training and household science, not including the cost of Departmental administration; the figures speak for themselves:

PRACTICAL SCIENCE AND ENGINEERING.

| | | |
|---|--------------|--------------|
| The University of Toronto, Faculty of Applied Science and Engineering | \$151,728 50 | |
| Queen's University Mining School, Kingston.. | 42,000 00 | |
| | | \$193,728 50 |

THE TRADES.

| | | |
|--|----------|-----------|
| Evening Classes | 1,799 00 | |
| Sault Ste. Marie High School | 5,000 00 | |
| Sudbury High School | 5,000 00 | |
| Hamilton Technical and Art School..... | 5,000 00 | |
| | | 16,799 00 |

ART.

| | | |
|---|--------|------------|
| Central Ontario School of Art | 400 00 | |
| Summer School for Drawing and Art Teachers at the University of Toronto | 617 80 | |
| | | \$1,017 80 |

AGRICULTURE.

| | | |
|--|------------|--------------|
| Ontario Agricultural College, Guelph | 234,815 67 | |
| Ontario Veterinary College, University of Toronto | 31,854 43 | |
| Teachers of Agriculture in the High Schools and Representatives of the Department of Agriculture | 16,800 00 | |
| Grants to Public School Boards; Agriculture and Horticulture in Rural Schools | 750 00 | |
| Grants to Teachers; Agriculture and Horticul- ture in Rural Schools | 510 00 | |
| Agricultural and Horticultural Societies | 122,774 31 | |
| Live Stock Branch | 31,770 10 | |
| Farmers' and Women's Institutes | 34,759 25 | |
| Dairy Branch | 56,642 41 | |
| Fruit Branch | 39,111 36 | |
| County Representatives | 20,972 19 | |
| Reports, bulletins, etc. | 21,445 36 | |
| Miscellaneous | 3,250 00 | |
| Faculty of Forestry, University of Toronto.... | 10,755 63 | |
| | | \$626,210 71 |

ELEMENTARY AGRICULTURE AND INDUSTRIAL ART.

| | | |
|--|----------|------------|
| Travelling Expenses and Board of Teachers- in-training attending at Guelph Classes in Elementary Agriculture and Horticulture and Industrial Arts | 2,755 49 | |
| Services and expenses of Instructors of above Classes | 736 00 | |
| Summer School for Teachers at the Ontario Agricultural College, Guelph | 1,172 00 | |
| | | \$4,663 49 |

MANUAL TRAINING.

| | |
|--|-----------|
| Public and Separate Schools | 12,532 53 |
| High Schools and Collegiate Institutes | 7,119 40 |

DOMESTIC SCIENCE.

| | |
|--|-------------|
| Public and Separate Schools | \$5,258 68 |
| High Schools and Collegiate Institutes | 2,383 72 |
| | \$27,294 33 |

SUMMARY OF ABOVE BY DEPARTMENTS.

| | |
|--|--------------|
| Practical Science and Engineering (Technical) | \$193,728 50 |
| Trades (Industrial) | 16,799 00 |
| Art (Partly Industrial) | 1,017 80 |
| Agriculture (Partly Technical but chiefly Industrial)..... | 626,210 71 |
| Elementary Agriculture and Industrial Arts (Pedagogical) .. | 4,663 49 |
| Manual Training and Domestic Science (Neither Technical nor Industrial) | 27,294 33 |

When pointing out above the sources of financial support, I described them as being "available at present." In dealing with the question of a Dominion Institute for industrial research, I pointed out the claims of the Provinces for the establishment of an institution which would render the same service to the trades as the

Experimental Farms now render to Agriculture, the Department of Mines to Mining, and the Department of Marine and Fisheries to the Fisheries. As I will now point out, we have also good grounds for claiming from the Dominion a contribution to the support of both the industrial and the agricultural educational schemes of each of the Provinces. The main grounds are as follows:

Claims of the Province for special financial aid.

1. No other form of education is so intimately bound up with national development and national prosperity. It has, accordingly, special claims upon the Department of Trade and Commerce. No argument should be needed to demonstrate the thesis that efficient provincial systems of industrial and agricultural education will directly advance the interests of Canadian trade and commerce, and do more than anything else to develop the resources of the Dominion. So fully, indeed, is this claim recognized in France, the German States, and Switzerland, that in these countries, with few exceptions, the technical and industrial schools are under charge of the Ministers of Trade and Commerce, not of the Ministers of Education.

Intimate connection between Agriculture and the Industries, and Trade and Commerce

2. Generally, also, the European schools are aided by the central as well as by the local Governments.

The German Empire has admitted the obligation by giving grants to shipbuilding and navigation schools on the Baltic. That she has done so little is due, no doubt, to the magnitude of her expenditures for Imperial purposes and to the fact that her federated States have not given up their taxing powers to the same extent as have the Provinces of the Dominion. In France, grants are made by the Republic, and, in the United Kingdom about half of the total cost of elementary education, including lower and middle industrial, agricultural, and commercial education, is borne by the Imperial Parliament, which aids the higher technical institutions as well. These countries have no provincial legislatures, but they contribute to the support of the schools from the national treasuries.

Example of other countries: Germany.

France and the United Kingdom.

Switzerland and the United States, however, afford exact parallels. In Switzerland, although education is wholly within the control of the Cantons, the Federation and the Cantons both contribute generously to the expense of industrial, agricultural, art, and commercial education. In the United States, also, notwithstanding the educational autonomy of each State and the supreme importance of State rights, Congress furnishes, under the Morrill Acts, already referred to, over 40 per cent. of the revenue of all the higher schools of technology; and these Acts provide for instruction "in such branches of learning as are related to agriculture and the mechanic arts in such manner as the legislatures of the States

Switzerland,

The United States.

may respectively prescribe in order to provide the liberal and practical education of the industrial classes in the several pursuits of life." I may mention also, as a sign of the times, that a Bill was introduced at the last session of Congress "to enable it to co-operate with the States in encouraging agriculture, the trades and industries, and home courses in the State Normal Schools, and to appropriate money therefor and to regulate its expenditure." The Bill contemplates an expenditure of over \$10,000,000. The Morrill Acts provide for higher technological education; this bill, their logical successor, provides for secondary and primary education of the same character. It has not yet passed, but my correspondence with competent judges gives grounds for the expectation that in essence it eventually will. Consistency demands that it should.

Obligation
admitted by
The Dominion

3. As I pointed out when discussing the desirability of establishing a Dominion Institute, the Dominion itself has also admitted an obligation. It promotes the advancement of agriculture in the Provinces and has already done something for the advancement of the other industries. In a few cases, not then referred to, it has even made grants more or less directly for Provincial education. It has established at Kingston a Military College for instruction in engineering, which is, confessedly, available for general as well as military purposes. It contributes \$2,500 a year towards the expense of the Railway School of McGill University, Montreal; it has given aid to various Industrial Exhibitions, the Royal Society of Canada, the Royal Canadian Academy of Art, the Royal Astronomical Society, and the Canadian Mining Institute. For a number of years, it has provided a series of free lectures to all candidates wishing to pass examinations for masters' and mates' certificates, on subjects pertaining to navigation, seamanship, etc. These lectures are held in nearly all the principal ports where there is an examiner, and in places like Vancouver and Halifax they are well attended. The lectures are supplementary to the instruction obtained elsewhere. The parliamentary grants to McGill University and the Royal Canadian Academy of Art are especially significant. Not all our railways are interprovincial; many of them are chiefly of local value; and no differentiation in favour of the employees of the former would be practicable. The Act of incorporation of the Academy provides that the objects of the corporation shall be "the encouragement of Design and the Industrial Arts and the promotion and support of education leading to the production of beautiful and excellent work in manufactures; such objects to be attained by the institution of a national gallery at the seat of Government, the holding of exhibitions in the principal cities of the Dominion, and the establishment of Schools of Art and Design." The Academy has not yet established any School; but

out of its \$2,000 yearly grant from the Dominion Parliament, it contributes to the support of the Central Ontario School of Art and Design, in Toronto, and of a similar institution in Montreal. Here we have a corporation established and maintained by the Dominion for the praiseworthy purpose of promoting in the Provinces a branch of education which, it is well known, is fundamental in every industrial occupation. The Royal Canadian Academy is, undoubtedly, of importance to the Dominion as a whole; but an Art School at Toronto or Montreal is no more Dominion in its outlook than a trade school would be in either of these cities. The sums so far granted by the Dominion for Provincial educational purposes are small, it is true, but the principle is the same as it would be if they were a hundred times as large.

4. In this connection it is most important to consider that the subsidies to the Provinces were settled at a time when the questions at issue had not attained their present importance and when the revenue of the Dominion and the volume of its trade were comparatively small. With limited resources and the necessary demands of other departments of the public service, it is more than doubtful if any of the Provinces will alone be able to make adequate provision for both industrial and agricultural education.

Limited resources of the Provinces.

From the foregoing statement, it appears to be clear that the Provinces have a claim upon the Dominion, based on the logic of the situation, the example of other countries, and its own action in the cases detailed above.

Conclusion.

The revenue of the Dominion for the financial year ending March, 1910, was \$101,503,710.93 and the expenditure \$79,411,747.12, leaving a surplus of \$22,091,963.81, and every indication points to a rising revenue and continued surpluses. Two or three millions for the purposes under consideration would hardly be missed, while the advantages to trade and commerce would far more than justify the appropriation. Subject to the provisions of an Act, the expenditure should, of course, be at the discretion of the Provinces. The newer ones would naturally use most of the grant for agricultural, the older ones for industrial education.

A Dominion grant justified by the revenue.

Closely connected, however, with the question of a Dominion grant are two considerations which cannot be overlooked, and which some regard as obstacles to action by the Dominion Parliament: The Confederation Act gives each Province absolute control over its educational system; and it is a principle of responsible government that Parliament shall account for its expenditures.

Reputed obstacles to a Dominion grant.

Educational autonomy of the Provinces

In discussing the question of technical education at its convention in 1904, the Manufacturers' Association pronounced in favour of "a general system with one standard curriculum and under one central management," and assumed that "it is the

Mistaken
attitude of
Manufacturers' Asso-
ciation.

function of the Federal Government alone to organize properly such a system of schools throughout the Dominion." My report has shown, I believe, that not even in the same Province can there be one standard system, and that, for the purposes of organization each locality must be treated as a unit. The Memorial presented by the Association to the Royal Commission last November shows, however, that it realizes its mistake; for it now asks the Commission to report upon a system suitable for each Province. My report has also shown, I believe, that, as in other countries, industrial and agricultural education cannot be separated wholly from the ordinary educational systems. Accordingly, the proposal of the Association that the Provinces shall accept a system of technical education controlled by the Dominion is one which I am sure none of them would entertain. Such a system could not be operated in terms of the Confederation Act. On this subject, you yourself, Sir, have spoken with no uncertain sound. In the report of your Department for 1909 you use these words:—

Attitude of
Ontario
Department
of Education.

The announcement that the Federal Government intends to appoint a Royal Commission of enquiry into the best means of encouraging technical training in all the Provinces is a suitable recognition of a national obligation. The framing of the customs tariff which determines in large measure the employment of the people in industrial occupations is exclusively in the hands of the Federal Parliament, the power having been taken over from this and other Provinces in 1867. I have long been of opinion that under the circumstances, federal grants for technical education should be made by the Dominion Parliament to be expended for specified purposes without infringing upon the absolute control of each Province over its own schools. The intention to appoint a Federal Commission I regard as the first step in carrying out a clear obligation.

Responsibility
of Parliament
may be
protected.

Nor need there be any difficulty in securing to the Dominion a reasonable guarantee that the money had been properly expended. The grant to each Province should be computed on the same basis as are the other subsidies; and the Act providing for the distribution should specify clearly the purposes for which the money is intended. All that the most exacting should require would be the submission to the Dominion Parliament of the detailed statement of the expenditure as given in the Provincial public accounts. The Dominion and Provincial auditors are responsible only to the legislative bodies that appoint them, and their certificate that the expenditure had been in accordance with the Act should be sufficient. In the event of a difficulty there would, of course, be as now, an appeal to the Treasury Boards. Usually, it is true the proper application of such grants is secured by inspection; but inspection, to be worth anything, means also direction, and inspection by Dominion officials of schools which must form an integral part of the Provincial systems would inevitably lead to a conflict of authority.

In support of the foregoing proposal I may again urge the precedent already set by the Dominion itself. The grants to the Royal Society, the Canadian Academy, and the Canadian Mining Institute are paid to the President and Secretary thereof, and are not subject to audit; the Societies merely send the Minister of Finance a copy of their report, in which they give a detailed statement of the total receipts and expenditure. The grant to the Railway Department of McGill University is given on condition that the Grand Trunk, the Canadian Pacific, and the Canadian Northern contribute at least an equal sum. In this case also the Government requires no account, but presumes that the University uses the money in a manner satisfactory to the railways. Speaking generally, the various Dominion Ministers, who are interested in such grants, are merely furnished with some general information as to their application. Why should the proposed Dominion subsidy in aid of Provincial Industrial and Agricultural education be made an exception?

The precedents already set.

2. LOCAL MANAGEMENT AND ORGANIZATION

Opinions differ in different countries as to the best system of local control. On the Continent of Europe, the higher technical schools are generally under special boards, sometimes with and sometimes without government representation. But, without any exception that I know of, the lower grade industrial schools are under the charge of boards of management on which are represented, either directly or through Advisory Committees, the industrial interests of the localities. Everywhere, during my tour, I made special enquiry as to the effectiveness and acceptability of such committees, and the evidence I gathered was conclusively in their favour. They secure the sympathy and co-operation of the local industries, bring the schools into close relation with the conditions of the trades, and keep the equipment and courses of study abreast of the times. Indeed, so highly valued are they that often each trade department of a school is provided with a specially qualified Advisory Committee which from time to time visits the department and aids it with its advice. In France and Switzerland the labour organizations are often specially recognized on these committees; but in Germany they are satisfied with the administration and do not ask for recognition. In England all the schools of a municipality supported by public funds are under the education committees of the county councils and their advisory committees. In the United States, except in Massachusetts, such schools are under the same board of education. In Massachusetts, the movement in favour of industrial education had

Industrial Schools on the Continent of Europe.

Advisory Committees; advantages.

Representation of Organized Labour.

Local Boards.

been opposed by many of the educationists of the older type, and it is felt there that the industrial schools will have a better chance of successful operation if placed, for a time at any rate, under boards without other alliances. To secure this object without, however, disrupting the unity of their system, some other States, following the example of Europe, provide advisory committees.

Schools of
secondary
grade for
Ontario.

The industrial and technical schools I have proposed will be of the secondary grade and their management should be entrusted to High and Municipal Continuation School Boards and Boards of Education. At present, indeed, most of the Manual Training and Household Science departments, from which no doubt will be developed our first industrial and technical schools, are under the control of the aforesaid boards; and the new schools are likely to commend themselves more to the pupils if they feel that on entering them they have been promoted to schools of a higher grade. The set towards the High Schools rather than towards Fifth Classes is due, in part at any rate, to the prevalence of this feeling. "We are dealing with a condition, not with a theory." I recommend, accordingly, that provision be made for the creation of an Advisory Committee in connection with the aforesaid boards of trustees. Various modes of appointing such a committee are now in operation. The following will, I think, meet the requirements of the situation in Ontario:—

Industrial
advisory
committees.

When any of the aforesaid boards shall have established by resolution a general or special industrial school or a technical school, whether day or evening, it should then or at its first meeting thereafter appoint a committee to be known as the Advisory Committee on Industrial and Technical Schools, said committee to consist of ten members, composed as follows:

Composition
and powers.

Of five members of the Board, including the representatives thereon of the Public and Separate schools, and of five other citizens, not members of the Board, duly qualified to vote at school elections and engaged in the local trades and industries, nominated by the Chairman and approved by the majority of the trustees then present; such nominations to include employees as well as employers of labour. The advisory committee so appointed should have authority, subject to the approval of the Minister of Education, to prepare courses of study and provide for examinations and diplomas, and, subject to the approval of the Board, to employ and dismiss teachers and to settle their salaries, to visit and report upon such schools, and to purchase machinery, tools, and supplies, and to provide suitable grounds and buildings for the use of such schools. In order to provide the necessary continuity of policy,

two of the original five members who represent the interests of the local trades and industries should be appointed for a term of one year, two for a term of two years, and one for a term of three years; and, thereafter, as the terms of the members so appointed expire, their successors should be appointed each for a term of three years. In the case of a vacancy during the term of any member, the Board should fill such vacancy for the unexpired term in the manner proposed above.

Mutatis mutandis, Advisory Committees should also be provided where there are agricultural and commercial departments. The agricultural departments have been established only recently and have not yet won their way to popular favour. Now especially they need the sympathy and support of the local farmer, whether they consist of two years' or of six weeks' courses. No doubt, also, the representative farmers on the advisory committees will be in a position to add to the efficiency of the courses. On the other hand, the commercial departments have been long established and are increasingly well attended. They do not need the moral support of representative business men. Nor would it be worth while to appoint such committees for schools which simply provide courses in bookkeeping, stenography, and typewriting. When, however, the curriculum of the school includes the Special Commercial courses whether of one year or of two years, prescribed by the Department, a well-selected Advisory Committee should be able to give valuable assistance in adapting the details to the actual business conditions of the locality. The closer vocational subjects and departments are brought to the life of the community, the better will the instruction be from both the practical and the cultural standpoint.

Agricultural
and Com-
mercial
Committees.

It is true, of course, that the boards themselves may include persons as much interested in the industrial, agricultural, and commercial departments, and as competent to give advice, as any others that may be co-opted; but this will not always be the case, and it will be of advantage to these departments to have their interests specially provided for. It will take both time and effort to counteract the adverse influences of academic tradition and the set towards the professions.

Here I may point out that in the European schools I visited, the successful completion of a vocational course is invariably marked by the issue of a diploma or certificate. In some of the German schools, such certificate or diploma is issued on the joint authority of the Government and the Board of Management. This plan I recommend for Ontario. The courses in the different classes of

Importance of
diplomas and
certificates.

Duty of
Employer.

our vocational schools will in their details be adapted to local conditions. A general test would, accordingly, be impracticable; but it will, I believe, be practicable to devise a scheme which will be free from the objectionable features of our provincial academic examinations, and under which Boards may issue certificates and diplomas, endorsed by the Minister of Education. The success of such a scheme will depend largely upon the attitude of the employer. By attaching value to the certificate or diploma in selecting his employees and organizing his business, he can do more for the advancement of vocational training in this Province than can either the Government or the School Board.

Local
organization
of schools.

Closely connected with the question of management is the relation of the industrial, agricultural, and commercial schools to the other schools of the locality. Having regard to the influences of tradition and the examinations and to the special character of the work, these schools and departments should, as far as practicable, be separate in organization from the academic schools and under separate principals. Manual training and household science, as defined in our curricula, are essential subjects of a general education. They are, of course, also basal for the industries; but the first mentioned phase of their content, being the comprehensive one, should determine their position in the organization of the curriculum and the scheme of control. From the present point of view no special provision is necessary for them.

Industrial
Schools.

First, then, as to the Industrial Schools, General and Special: The mathematics, science, English, and work-shop courses must be wholly separate from the corresponding classes in the academic High Schools, and must be taught by teachers who have been specially prepared for the work. At present, in the so-called technical High Schools and High School departments, these subjects are almost invariably taught by the ordinary members of the High School staffs, whose chief duties and whose ambitions are connected with the academic work of the school. They do not possess the special knowledge that would enable them to correlate the subjects with the practice of the industrial school; and, even if they did acquire this knowledge, it would be futile to expect them as a class to be zealous for a department in which they have no vital interest. As a matter of convenience and economy, the industrial classes we are now contemplating might be taken in the same building as one of the other schools; but they should be under the control of an independent principal. Of course, as is now provided where a Public and a High School are in the same building, the principal of the Public or the High School should be supreme in those parts which the schools would use in common. The future of the industrial school should not be imperilled by

intimate association, with schools whose main object has hitherto been the preparation for the professions and the universities.

As to Technical Departments and Schools: It is altogether likely, as I have already shown, that it will be some years before our conditions justify their establishment. As a first step in their evolution we shall probably have courses consisting of manual training, and some academic subjects more or less related to industry. But, for the same reasons as I urge in the case of industrial schools, the same principle of organization should be followed as soon as they can be established as departments or schools. To be efficient, they will require different courses of study, separate staffs, and, to a large extent, separate equipment, class-rooms, workshops, and laboratories.

As to Agricultural Classes: Here, too, as my report has shown, for some years we can expect not more than short courses, taken either by the pupils of other departments or by pupils who take these classes only. In such cases, the principal will make the necessary provision, subject to the direction of the Advisory Committee. When, however, we have separately organized agricultural departments and agricultural schools, we should then have separate principals.

The Commercial Departments are so well established and the classes are so generally well attended that no further provision appears to be necessary than the Advisory Committees already suggested. As in the large cities of the United States, and as now appears to be decided in the City of Toronto, economical as well as pedagogical reasons justify the establishment of separate High Schools of Commerce in all the large cities of Ontario.

Not many even of our cities are likely to have more than one Commercial Department and one Industrial School. A city, however, like Toronto, which covers a large area and which has a large population, should provide for those who have completed the fourth form of the Public School course or for whose admission special provision is necessary, branch preparatory day and evening commercial, industrial, and general schools, with a central High School of Commerce, a central Industrial and Technical School, and general evening classes in the High Schools for those who can take up the special work of the secondary school. Evening classes of an elementary character, preparatory for those of the secondary grade should also be provided in suitably distributed Public School centres. Effective organization takes into account the convenience of the pupils, the proper gradation of classes, and the economic distribution of the staff. In this connection the organization adopted in Manchester, Liverpool, Glasgow and Edinburgh, and the cities of the Continent is well worth careful consideration.

3. COMPULSORY ATTENDANCE OF ADOLESCENTS

Importance
of the
problem.

How solved
elsewhere.

In any provision for education, one of the greatest difficulties is that of securing regular and adequate attendance. For reasons already dealt with, most of those pupils who now intend to join a trade or to become farmers leave the public or the separate schools at 13 or 14 or even earlier; few join from the higher schools. Accordingly, the most important educational question at present is: How can the regular and adequate attendance of such pupils be secured from 14 to 16 or 17; or, indeed, how can it be secured at all? The establishment of the proposed industrial and agricultural schools will, it is true, under proper conditions induce more to remain at school; but others who might attend will prove indifferent to their opportunities, and others, again, are obliged to earn a livelihood as soon as possible. This problem Germany, Switzerland, and Scotland have solved by extending the scope of the compulsory attendance laws to 17 years of age or over, and by providing evening schools and part-time day schools. London and some other British cities have attempted to solve it by maintaining a liberal system of scholarships and maintenance grants in connection with their day schools and by promoting in every way attendance at the evening schools. The recent report of the English Advisory Council suggests in a half-hearted way means of improving the attendance under the present voluntary system; but there can be no reasonable doubt that England will eventually follow the example of Scotland. This, indeed, is the burden of the Advisory Council's report. In the United States, New York has also taken a step—a short one, it is true—in the same direction. In that State, until 17 years of age, a child must be either in school or at work; for the past two years, Nebraska has made attendance at school compulsory, under certain reasonable conditions, until 16 years of age for at least two-thirds of the year; and in its session in 1910 the Ohio Legislature passed an Act compelling the child between fourteen and sixteen who has failed to reach certain academic standards to give a portion of his working period to after-training in day schools. So far, however, the legislation in the United States is in the experimental stage, but the fact that the movement for extending the age of compulsory attendance has met with favour in a democratic country is itself suggestive.

Necessity for
the provision
in Ontario.

To spend large sums of money on industrial and agricultural education without taking means to insure attendance is neither logical nor economical. It is of material importance that the existing Truancy Act should be properly enforced. An Ontario law making full-time school attendance compulsory until 16 or 17 would also

be desirable. But such a law is impracticable; for many between 14 and 16 or 17 are now and always will be compelled by dire necessity to earn what they can. On the other hand, to enact a law similar to the European compulsory continuation school laws appears to me to be both desirable and practicable. Its provisions should, of course, refer at first only to urban municipalities; for, in these, the appointment of a truant officer is imperative by law and his services would be available in connection with the proposed change. So long as the proposed Act provides for "local option," no one can reasonably object to its enactment. I suggest the following as the basis for an amendment to the present Truancy Act:—

1. It should be lawful for any urban High or Municipal Continuation School Board or Board of Education from time to time, at a special meeting called for the purpose, to make, vary, and revoke by-laws for required attendance at day or evening classes until such age, not exceeding 17 years, as may be specified in the by-law, of any adolescents above the age of 14 within the municipality who are not otherwise receiving a suitable education or are not specially exempted by the School Law from the operation of the by-law; and to require such attendance at such times and over such periods as may in such by-laws be specified.

Local Option.

Proposed additions to powers of School Boards.

Power to pass by-laws requiring attendance until 17.

2. The Board should also have the power, after consultation with both employers and employees, to frame by-laws for either sex or for both, and for those engaged in particular trades or occupations, and to determine in each case the age or ages up to which the by-laws should apply within the limit of 17 years of age. It should also have power after like consultation to fix the hours and seasons at which the compulsory classes should be held.

Power to determine the application of the by laws.

3. Such by-laws should also require all persons within the municipality, over which the School Board has jurisdiction, having in regular employment any adolescent to whom such by-laws apply, to notify the same to the Board at such times specified in the by-laws with particulars as to the hours during which the adolescent is employed with them.

Employers to notify Boards as to adolescents.

4. Provision should also be made for the due enforcement of the by-laws by the Truant Officer and for penalties in the case of any parent or guardian whose neglect has led to failure on the part of the child to attend the classes provided for above; also, in the case of employers who do not give the notification required above or who knowingly employ an adolescent above the age of 14 at any time without his attendance as required under the by-laws.

Duties of Truant Officer and parents or guardians; penalties.

5. In order also to make certain that the enactment of such by-laws is supported by public opinion, without which indeed it would be useless to attempt to enforce them, provision should be

Provision for submission of by-laws to qualified voters.

made for the submission of the question to the ratepayers at the next annual election for school trustees, if within, say, one month of their enactment twenty per cent. of the duly qualified electors so petition. A similar provision, I may add, has been made by the Wisconsin Legislature in the matter of the establishment of trade schools by a school board.

A practicable
measure.

It is certainly true, as I have already pointed out, that even the present moderate provisions of the Truancy Act have not been generally enforced. This, however, should not prevent the enactment of the amendment I propose; for the provisions of the Truancy Act have been fairly well enforced in most of the municipalities where the amendment would likely be adopted, and it is not unreasonable to expect that the enforcement of the proposed amendment would commend itself to employer and employee and their liberal-minded fellow citizens. Here I may add that the machinery for such a provision has been adequately tested in several European countries, and it should be the duty of the Director of Technical and Industrial Education to instruct and supervise Boards in its operation.

VI. SUMMARY OF RECOMMENDATIONS

As the conclusion of my report, I submit a summary of my recommendations:

I. FUNDAMENTAL

1. A good general education as an essential preparation for all vocations.
2. A closer connection between our schools and the activities of life.

II. INDUSTRIAL AND TECHNICAL EDUCATION

PROVISION FOR INSTRUCTION OF PUPILS AT SCHOOL

1. In the case of the large number who leave school at or before fourteen, the extension of the present provision for teaching Household Science and Manual Training, as a basis for men's and women's trades as well as for cultural purposes.

2. In the case of the comparatively small number who remain at school for various periods after fourteen, the establishment of the following classes of day schools, by Boards of Education and High and Municipal Continuation School Boards:

(1) The General Industrial School with courses in Shop Work and in English, Mathematics, and Science related thereto; all being treated from the point of view of the needs of the workmen and workwomen, and the cultural education of the Primary Schools being continued.

(2) The Special Industrial School, providing for the trades and similar occupations, and including the full-time day school, and the part-time co-operative school.

(3) The Technical High School or High School Department, for pupils who will remain three or four years at school and are preparing for directive positions in connection with the industries.

PROVISION FOR INSTRUCTION OF WORKMEN AND WORKWOMEN

3 In the case of workmen and workwomen engaged by day in their various occupations, the establishment by the aforesaid boards, of the following classes of schools:

(1) The Apprenticeship School in which the apprentice attends for part time the Day Industrial School, and the Day or Evening Apprenticeship School provided by the employer himself.

(2) The Evening School, supplementing the day shop-work by instruction in the evening in the subjects of the Day General and Special Industrial Schools and the Technical Schools.

(3) The Correspondence-Study School, providing instruction partly by correspondence and partly by a staff of travelling teachers.

ORGANIZATION

4. (1) Each industrial centre to rank as a unit for the purposes of organization.

(2) The appointment of a special departmental officer to act as Director of Industrial and Technical Schools, and to assist Boards in the establishment and organization of such schools.

AN ONTARIO INDUSTRIAL AND TECHNICAL COLLEGE

5. The establishment of an Ontario Industrial and Technical College, with an industrial museum, for the training of all grades of industrial teachers, of workmen who have already spent some years in apprenticeship, for pupils who have taken courses at the Special Industrial Schools, and for the conduct of a Correspondence-Study School with travelling teachers.

ORDER OF URGENCY OF THE FOREGOING PROVISIONS

6. (1) The immediate provision of Industrial and Technical Evening Schools where competent instructors can be secured, with liberal support from Legislative grants.

(2) The appointment of a competent Director as soon as one can be secured.

(3) The establishment of an Industrial and Technical College, and, in particular, the provision of an adequate supply of competent teachers.

(4) The further organization of a complete system of industrial and technical schools in accordance with the financial capabilities of the Province, after the disclosure of the attitude of the Dominion on the question of a special subsidy to the Provinces for the improvement of agricultural and industrial education.

III. A DOMINION INSTITUTE OF INDUSTRIAL RESEARCH

7. The establishment by the Dominion Government, of an Institute of Industrial Research, for the advancement of the trades, as the Dominion has already done in the case of agriculture, mining and other departments.

IV. DRAWING AND ART EDUCATION

1. The further extension of the provision for Art and Drawing in the Primary and Secondary Schools.

2. The establishment of a Central Art School in Toronto with both day and evening classes for the fostering of the Fine Arts, for the preparation of special teachers of Art, and for the special education of workmen in the more artistic trades.

3. The establishment of other Art Schools and Departments in other centres of the Province.

4. More generous support of Art by Legislative grants.

V. AGRICULTURAL EDUCATION

1. The further extension of Nature Study and Elementary Agriculture in the Primary Schools with the attendant School Garden.

2. The re-organization of the provision for Agriculture in the High and Continuation Schools, and the extension in connection therewith of the present system of County representatives of the Department of Agriculture, as a step in the development of School Departments of Agriculture and Agricultural High and Continuation Schools.

3. The appointment of a special Departmental officer to act as Director and inspector of the Primary and Secondary Agricultural Classes, and to stimulate the development of such classes throughout the Province.

VI. COMMERCIAL EDUCATION

1. The better adaptation of our school courses to business life and the requirements of the different kinds and grades of business.

2. The provision of practical courses and of better theoretical courses for Commercial Specialists and of preparatory training for such teachers.

VII. GENERAL PROVISIONS

SUMMER AND SPECIAL SCHOOLS

1. The extension of the present system of Summer and other Special Schools for teachers of Nature Study, Agriculture, Art and Drawing, Commercial subjects, Household Science, Manual Training, and Industrial subjects.

FINANCIAL SUPPORT

2. The provision of adequate grants for Vocational Education by the Legislature of the Province, by the municipalities concerned as part of the school rates, and by a special subsidy from the Dominion for the advancement of both Agricultural and Industrial Education in the Provinces.

ADVISORY COMMITTEES

3. (1) The appointment of Advisory Committees for the management of duly established Industrial and Technical Schools; such Committees to consist of members of the School Boards and an equal number of other citizens, representing the employers and the employees, who are qualified voters and who are specially competent to advise and assist, and the proposals of such Committees to be subject to the approval of the Boards with which they are connected.

(2) The establishment of similarly constituted Committees for the management of Agricultural and Commercial Departments and Commercial High Schools.

RELATION OF VOCATIONAL TO ACADEMIC SCHOOLS

4. (1) The organization of Industrial Schools with separate staffs and courses, and under separate principals.

(2) The organization of the Technical, Agricultural, and Commercial Departments to remain as at present, except where they may be organized as separate schools.

COMPULSORY ATTENDANCE OF ADOLESCENTS

5. The enactment of a Provincial law with "local option," giving Boards the power to pass by-laws to compel the attendance at school of adolescents between fourteen and seventeen, under certain specified conditions.

APPENDICES

APPENDIX A

ATTITUDE OF INTERESTED PUBLIC BODIES

Canadian Manufacturers' Association

In 1906 the Canadian Manufacturers' Association presented to the Governor-General-in-Council the following resolution, passed at its previous meeting:

Be it resolved that the Dominion Government be requested to appoint a commission to report on the best method for establishing a comprehensive national system of Technical Education to provide Canadian industry and commerce with trained assistants from amongst the Canadian people, and thereby aid in developing Canadian industry, and do away with the present condition of affairs, which compels employers to go abroad for men to occupy the more responsible and more remunerative positions in Canadian enterprises.

The memorial which accompanies the resolution reviews at some length the efforts of the Association in the field of technical education, and presents a strong case for financial assistance from the Dominion Parliament. The resolution quoted above was endorsed by each branch of the Association at Toronto, Montreal, Quebec, Halifax, Winnipeg, and Vancouver, and by the principals of the Universities of Laval, McGill, Toronto, Queen's, Dalhousie, and Manitoba.

The efforts of the Association bore fruit last June, when the Dominion Government issued an Order-in-Council constituting a Royal Commission for the purpose of enquiring into "the needs and present equipment of our Dominion of Canada respecting industrial training and technical education, and into the systems and methods of technical instruction obtaining in other countries."

Board of Trade of Toronto

In March, 1899, the matter of industrial education was taken up actively by the Board of Trade of Toronto, which then sent representatives to Ottawa to lay before the Government the importance of the subject. In June of the same year the following resolution was adopted:

That this meeting most heartily endorses the movement in favour of a broader and more thorough technical training in all its branches in this country, and pledges itself to forward the movement by all means in its power, and that the chairman do appoint a small committee as a nucleus.

The subject has been followed persistently ever since, and the Board stands exactly in the same position as it did when that resolution was adopted.

American Federation of Labour

The following is a report adopted at Toronto in November, 1909, by the American Federation of Labour, in which Canada is represented :

We favour the establishment of schools in connection with the Public School System, at which pupils between the ages of fourteen and sixteen may be taught the principles of the trades, not necessarily in separate buildings, but in separate schools adapted to this particular education, and by competent and trained teachers.

The course of instruction in such a school should be English, mathematics, physics, chemistry, elementary mechanics and drawing, with shop instruction for particular trades; and for each trade represented, the drawing, mathematics, mechanics, physical and biological science applicable to the trade, the history of that trade, and a sound system of economics, including and emphasizing the philosophy of collective bargaining. This will serve to prepare the pupil for more advanced subjects, and in addition to disclose his capacity for a specific vocation.

In order to keep such schools in close touch with the trades there should be local advisory boards, including representatives of the industries, employers and organized labour.

We recommend that any technical education of the workers in trade and industry, being of public necessity, should be not a private, but a public function, conducted by the public and at the public expense.

Trades and Labour Congress of Canada

The resolution of the Trades and Labour Congress of Canada on the subject of industrial training is as follows :

Resolved, that inasmuch as the natural resources of Canada in its rivers, in its forests and in its farm lands, are of immeasurable extent and commercial value, and are urgently calling for the best and most approved means of development and utilization; and whereas the present methods of production require further scientific stimulus—more especially in the mechanical branches—of a broadly national character, through a proper and special educational system; be it resolved, that this Trades and Labour Congress of Canada place itself on record as in favour of the establishment of industrial technical schools throughout the Dominion, and it is hereby an imperative instruction to the executive of this body to use its best efforts at an early date in urging the importance of the subject upon the serious attention of the Dominion Government, with a view to the establishment of such a system of special education throughout Canada.

In addition, the Congress has from time to time presented memorials to the Dominion Government, from one of which the following is a quotation :

The workmen of Canada are strongly of opinion that the welfare and development of Canada demand some large scheme of technical education. It is not a matter alone for the welfare of the workmen or of the employer, but of the whole Canadian people. We want Canada to be foremost in the arts and manufactures, and we are just at that stage of industrial development when the institution of technical schools would be of most value.

APPENDIX B

I. OPINIONS OF EMPLOYERS OF LABOUR

In I. below, I give selections from over one hundred replies I received from manufacturers and other employers of labour to a circular asking for a statement of the system of apprenticeship followed in each industry, the faults of the system and the manufacturer's opinion of the best way to remedy them.

In another circular I made enquiries as to the age at which workers generally enter the factories; the forms or grades of the Public Schools from which they come; the manufacturer's estimate of the education they have received; and the age at which the manufacturer thinks they should enter to be of most use for his industry. With very few exceptions, the employers of skilled labour put the age at about 16. In this case I have not quoted the replies. A few of the former replies refer to the age, but the reference is merely incidental.

In II. below, I give statements from the educationists who have had charge of our Manual Training Departments as to the conditions of the problem from their point of view.

American Bank Note Company, Ottawa

I. A. Machado, General Manager.

1. We take apprentices in the several different trades required by our work, who serve from three to five years according to the trade.

2. We have no special complaint to make of the present system but feel that a great improvement could be made if there were some industrial schools in Ottawa, from which we could draw our apprentices.

The writer is a very strong believer in the economic value of manual training and technical schools. A practical start in this direction could be made by establishing industrial schools from which manufacturers could be supplied with promising material, showing aptitude for one class or another of work.

American Watch Case Company of Toronto

W. K. McNaught, M.P.P., President.

In regard to the system of apprenticeship in our industry I am sorry to say that apprenticeships are a thing of the past in this business. The reason for this is twofold.

1. The majority of the boys themselves as well as their parents object to any apprenticeship at all, as they do not want to be bound down for so long a time, and always have a feeling that if they can get 50 cents or \$1 a week more anywhere else, they want to be in a position to leave and take it. This, of course, is the objection from the boys' side.

2. On the other hand the apprenticeship system has been practically killed on account of the sub-division of labour and the introduction of labour-saving machinery. In the old days of this business, as I presume in many others, the boy served an apprenticeship of five years; and, as but little machinery was used, during this time he learned practically every branch of the business and

was a general all-round worker. To-day this business is sub-divided into probably twenty or thirty distinct branches, each of which uses automatic machinery as far as possible. The result of this is that the beginner learns only one branch of the business, and probably he learns only to run one machine or to perform one operation. As a rule it requires but a short time, say two or three months at the outside, to learn to operate any machine thoroughly or to learn to perform any one separate operation. This state of affairs prohibits any one person learning the entire trade under modern conditions, and is therefore incompatible with the old apprenticeship system.

I cannot say that in my opinion the present system is faulty. It is modern, and has therefore ousted the old order of things on account of its being able to produce goods much cheaper and better than they were ever made under the old system.

These new conditions are here to stay. In fact, they will, if possible, be accentuated in the future, and it seems to me the only thing to do, therefore, is to try and educate labour in such a way that it can make the best of present conditions. In my opinion this can best be done by a system of general technical training by which boys would be taught to use their hands as well as their brains in making simple things and in the general use of ordinary tools. They should also be taught to draw and be given some idea of designing. In fact, education of this sort, in my opinion, should be along broad lines, which would make them better fitted to go into any business whatever.

John Bertram & Sons Company, Limited, Dundas

I.

Henry Bertram, Secretary-Treasurer.

The following system of apprenticeship has been in operation in our works in practically the same form for about forty years. The fact that for a great many years we were the only concern in Canada engaged in our particular line made it necessary for us to train apprentices in our own system, in order to have a supply of skilled help to carry on the work, and our present staff is to a great extent the result of training up our own men.

1. Apprentices are accepted according to priority of application, but educational standing is given first consideration, i.e., a boy with high school training has preference over one with public school education.

2. Apprentices serve four years (and lost time) at any one of the following trades: Lathe hand, planer hand, fitter, pattern maker, moulder, draftsman; but special five year apprentices are given instruction in each of the above except "moulding." Apprentices in the drafting rooms are given the privilege of shop experience, serving a portion of their time in the works.

3. All apprentices are bound for their period of apprenticeship, making a deposit of one hundred dollars as security, which amount, with bank interest, is returned to them when their apprenticeship is completed.

4. Wages are paid at a fixed hourly basis for each year, so that pay increases automatically at the end of each year.

The only serious fault in apprenticeship in a small town like ours, is the determination of parents to give their boys "a trade" (*any trade*) and as the fathers of a large proportion of our apprentices are employed in our works, the boys are apprenticed to their fathers' "trade," *it being the most convenient*, without considering in any way their adaptability for it. This causes "misfits." A boy who gets along passably well is "bound" and by force of circumstances is compelled to complete his apprenticeship in a line of business in which he takes no real interest.

The remedy lies with the parents in a considerable degree, as by proper observation of their children's talents, the proper calling for them could be decided upon. But some system of industrial education (manual training or elementary technical education) is required to give our boys a chance to decide intelligently for themselves what line of business will be congenial.

II.

Charles E. Dickson, Cashier.

1. Apprentices start work here at an approximate average age of seventeen years. It is not possible to give the actual average, as we have not complete records of apprentices' ages.

2. The majority of our apprentices come to us from the High School entrance class, and quite a number have a partial High School education. An occasional boy is accepted who has not reached the highest Public School grade, but as a usual thing we require at least that standing for our apprentices. The average apprentice gets along fairly well on a Public School education, *after he has found out in the shop how to apply it practically*, which means that the shop has to do what the schools should do to make a boy's education of practical value to him.

3. It is quite difficult to say just at what age a boy should enter the works in order to be most useful. Boys at 15 to 16 years of age, who are mechanically inclined, show much greater aptitude in learning to handle tools than boys of maturer ages. On the other hand, young men of 20 and over who have been apprenticed here have invariably taken a deeper interest in the work, and have without exception made good mechanics. The younger boys are handicapped by lack of ability to apply their knowledge in a practical way, and the older ones, who have learned by experience in other mercantile lines to apply their knowledge practically to a greater or lesser degree, have reached an age where their aptitude for learning is considerably less than that of younger boys. To our mind, there is only one inference—our present system of Public School education is "lopsided," being entirely theoretical. The boy who completes the public school course goes out into the business or mechanical life and wastes, in many cases, years in learning the practical application of the knowledge he already has. Manual training in our schools appears to be the only possible solution of the problem, but it must be on a far wider basis than the system already instituted in the various centres. At present it is more or less confined to woodworking, on account of the expense of installing equipment for other lines, but it must be borne in mind that each town or district has distinctly separate needs. If a town is largely engaged for generations in ironworking, as in our own case, it is natural that the children of our workmen should have a natural aptitude toward ironworking, and manual training and elementary technical education in this direction would save them years in after life. We are free to admit that manual training, even in woodworking alone, is a long step in the right direction, but to meet present-day needs as they should be met, the system should be broadened and made elastic enough to be adapted to the varying needs of different communities. This would assist in specialization in the manufacturing lines of various districts, which experience in England, Germany and other countries shows to be the natural trend. Heredity in this direction must be acknowledged and provided for, and a system of manual training which recognizes the principle assists materially the force that has made Sheffield, Nottingham and dozens of other cities, world famous manufacturing centres.

Berlin Interior Hardwood Company, Limited, Berlin

We start young men at a low salary with a bonus at the end of each year, increasing the salary for the second year and also the bonus for the second year and likewise the third year. These men are placed under the supervision of

a practical man whose duty it is to give instructions in the practical use of tools. We have found this the best method of making the best mechanics of these young men.

We might say that our business is somewhat different from the ordinary woodwork, in this respect, that we manufacture interior fittings for banks, offices, etc., and these boys have to work from full size detail drawings, and we are strongly of the opinion that schools for industrial education should be first to teach them to read drawings and details in connection therewith, following up with the practical use of tools and the proper method of applying them. This certainly is the most needed at the present time, and with this training, we believe, the pupil would know whether he had a liking for the trade before commencing to work in a factory, as they would then have sufficient experience to understand just what this particular trade required.

Another question that we believe would be well to consider is economy in the use of material in this age of keen competition, as we find in many instances that, for the want of proper knowledge, material is wasted.

In our opinion the present scarcity of skilled mechanics is largely due to the manufacturers themselves, inasmuch that with the modern machinery they start men at one particular job and keep them at that until they become expert at that one job, but take them off that job, they are entirely at sea and are unable to help themselves. This principle, we believe, is a good one for neither the mechanic nor the manufacturer, and we believe that there is no better way than for the manufacturer to take his apprentice and put him through the entire line of work.

We believe that if Industrial Schools were established in different parts of the Province, they would give the young men a desire, after completing their course at school, to continue their particular trade.

Bredin Bread Company, Limited, Toronto

M. Bredin, President and Manager.

We have been 23 years in business and have only had two regular indentured apprentices, serving only three years each, so that we are safe in saying that the journeymen bakers with anything like a thorough grounding in this trade are fast dying out as a class.

As to the faults of our system and the remedy:

I am of the hope that technical education is the only hope of the future in our trade, and I may go further and say that the only hope of providing the people, as a whole, with a good, wholesome, nutritious and properly manufactured loaf of bread, "the Staff of Life," is to have provision made for the technical training of at least a limited number of young men in the chemistry and food value of flours and yeasts so that there would be a sufficient number coming along to fill the more important positions in the large bread factories that are growing up in all our cities, and also positions in any of the smaller shops in city, town or village.

Berlin Furniture Company, Limited, Berlin.

J. E. Jacques, Director.

We have to advise you that we have no system of apprenticeship, as the custom of taking on apprentices seems to have died a natural death some time ago. We simply take on youths and keep them as long as we possibly can, but in no instance is it very long, as in about six months they imagine themselves to be experienced journeymen.

Brigdens Limited, Toronto (Late The Toronto Engraving Company, Limited)

George Brigden, Manager.

The most striking fact which confronts one is that but very few are able to draw even the simplest object in an accurate manner. To draw a chair or table in clear outline, in proper perspective and proportion is, in many cases, an impossibility; but ask the same person to draw a figure, and you will have produced a drawing, more or less smudgy in outline, but possibly correct in form. In doing the latter the student will display intense interest, but to do the first is considered but child's work and almost beneath his attention; a clear evidence that he has not had instilled in him that most essential feature of commercial art, viz., definiteness of line and accuracy of form. Judging from the examples brought in for inspection, the almost universal idea appears to prevail that to paint a picture or portrait is the acme of art. To but few is given such a gift, and our technical art schools should devote their energies to dispelling from the student's mind the notion that there is any pronounced demand in this country for work of this character.

A Technical School should be devoted exclusively to Commercial Art. It should be clearly pointed out to the students that those who study in its classes should be those who desire to apply the knowledge gained to the trade or calling for which they have a particular inclination.

Art as related to the painting of pictures and portraiture should be entirely ignored. Only that which applies directly to the manufacturing industries should be taught. The primary classes should be thoroughly and persistently trained to produce drawings in clean outline, devoid of shading. Accuracy and neatness should be set before them as the acme of result. Elementary lessons in geometry and perspective should be given at least once a week. After spending a term or so in this work, the teacher will be able to determine what special line the student is best suited for. The classes should be divided into three main branches, viz., mechanical, design, and figure drawing; but before selecting any one, the student should be thoroughly grounded in the basic principles above enunciated.

In the mechanical classes the correct drawing of nuts, screws, gears, piston rods, wheels, chains and the essential parts of machinery should be taught. Lessons in mechanics should be frequently given, so that as the students advance they may understand how to draw machines not only in elevation but in section. A close study should be made of standard machines and engines. They should know how to erect one from verbal descriptions or rough drawings. Having learnt this, they should take up the matter of proper shading. The use of the air brush as applied to shading should be taught. It may be a surprise to you to know that there are not two artists in Ontario who can draw a carriage correctly for illustrative purposes. Such work has never been taught, the result being that thousands of dollars leave our Province yearly for United States cities for providing catalogues for carriage manufacturers.

The field of design is a large one, compassing many trades, each one demanding a special training of itself. There are several valuable works dealing with this subject, such as Jones' "Grammar of Design," which should be bought and kept in a library for frequent reference. Wall paper designs, carpet designs, book and catalogue covers, are in constant demand. Artists who can plan out and design booklets in their entirety are never in want of a situation. Designers of furniture, stained glass, ornamental iron ware, electroliers, gas fixtures, etc., are badly needed. We are far too dependent on outside sources for such things. Our country is growing rapidly, and each day hears a greater call for artists who can fill such positions.

Figure drawing, as applied commercially, should be taught by a teacher who is thoroughly acquainted with the demands of catalogue and illustrative work. Life classes should be formed. Anatomy should be studied in a most comprehensive manner. This is perhaps the highest grade of commercial art, and requires the constant study of the best obtainable models, and only those who show a decided taste for this work should be encouraged to take it up. That it has not been taught properly has been evidenced frequently in our establishment. On several occasions I have been told by students that they have learnt more in two months in our office than in several sessions in the technical schools. This may be a severe arraignment; but facts are stubborn obstacles, and, if we are to make a success of our schools, the conditions demanded by manufacturers must be carefully studied and every possible effort put forth to meet them.

It has been thought in some quarters that my criticisms given before the Commission referred to the work being done in the Ontario School of Art. I had no idea of referring to work done by this institution, which covers a different field from that of a technical school. The training given in this school is more especially for those going in for the higher branches of art, figure, and portrait painting, and illustrating of magazines, etc. It is, of course, inevitable that the technical school in its higher branches should cover some of the work being done in the School of Art. This, however, should not in any way take away from the value of either school, and I am sure you will agree with me that, following along the lines of all the great English centres where Art is flourishing, it is time that we in Canada had both sides properly developed.

Canada Carriage Company, Brockville

T. J. Storey, President and General Manager.

In my opinion the instruction of artisans is a most important branch of the educational system of Canada to-day. The people are going beyond all bounds in the effort to get book learning, and take no thought of how the boys are to earn their living after they leave school.

In a large percentage of the cases the extent of education that has been given them has unfitted them for work, and I trust that the government will take this matter up thoroughly, and follow some of the plans they have in Germany and England, and teach boys how to use their hands and control them with their brain.

We are not making any mechanics, nor can we find anyone who wants to learn a trade, unless he can begin at journeyman's wages, in doing it, and as a result all our mechanics are being drawn from Europe.

Canada Cycle and Motor Company, Limited, West Toronto

T. A. Russell, General Manager.

1. Our system of apprenticeship is rather limited. It applies only in machine departments. The apprenticeship period is four years. The apprentice receives a small wage the first year, which increases each year of his apprenticeship. He is given facilities to learn all the machine shop operations that are practised in our shop.

2. The great difficulty at the present time with this system is, that very few young men are taking an apprenticeship, and out of those that do commence, a great many drop out before they have finished their course, with the result that they become only fair workmen and not, by any means, skilled.

It seems necessary to devise some method of education for those entering industrial life, so that they can obtain such training as will fit them to become skilled workmen in a shorter period of time than the old apprenticeship system.

Canada Foundry Company, Limited, Toronto.

Geo. W. Watts, Manager of Works.

1. The system followed by us is to article an apprentice for a period of four years.

2. The main fault of this system is a lack of sufficient education on the part of the apprentices to enable them to obtain their maximum efficiency during the term of apprenticeship.

The best way, in my opinion, to remedy this is instruction in technical schools in the evenings, but the difficulty is to ensure the attendance of the apprentice at the lectures. If some scheme can be devised that will ensure regular attendance at such lectures, great good can be done.

Canadian Locomotive Company, Limited, Kingston

C. Birmingham, Managing Director.

Below we give you the desired information as to our apprenticeship system. Our apprenticeship agreements must be signed by the parent, or guardian, of the young man who is applying to be taken on as an apprentice—this for the purpose of establishing that the conditions are clearly understood, and also as authority to us to pay the apprentice's wages to him direct.

We exercise a good deal of pains to see that the apprentice is given an opportunity to learn all branches of whatever trade he selects to follow; that is to say, he is not kept on any one particular job an undue period of his time, but if he enters say as an apprentice to the machinist trade, by the time his term is completed—if he has ordinary ability and application—he should be a thorough mechanic.

With reference to the faults of our system, we find it gives a fair amount of satisfaction both to the apprentice and ourselves, but if there were any way of giving the young man additional educational facilities, it would, of course, result in a higher class mechanic when his term was completed. Doubtless you are aware of a system which has been tried (with apparently good results) in Cincinnati and other places, where, by the co-operation of employers and an educational institution, the apprentices alternate, serving say two weeks in the shops, and then two weeks in the classes of the college, the continuity of the work not being interfered with by having a double number of apprentices on the staff, so that there are always half in college and half in the shops.

Owing to the fact that there are so few manufacturing establishments in our line here, we do not see how this would be practical; but if you can devise some system whereby this can be accomplished, it will doubtless do much good.

Canadian Westinghouse Company, Limited, Hamilton

C. H. O. Pook, Assistant Manager of Works.

Engineering Apprenticeship System

This course has been arranged for graduates of Universities and Technical Schools, and is of two years' duration.

The company desires to train a skilled force of engineers, upon whom it can draw for assistance in the various branches of its industry.

Approved applicants are given the opportunity of entering the works in order that they may become familiar with the various manufacturing operations and the general construction and working of the apparatus produced. The engineering apprentices are afforded, in the various departments of the works, actual shop and engineering experience, both mechanical and electrical,

and the work of the technical school will be supplemented by the practical training thus afforded. Upon the completion of the course it is expected that the engineering apprentice will have prepared himself for filling satisfactorily a position in some department of the company's service. Preference in compensation and position is given to those who prove their work by aptitude and diligent attention to duty during the apprenticeship period, and by an intelligent appreciation of the work.

Machinist or Shop Course

Intelligent young men desiring to learn the machinist trade are admitted to the company's apprenticeship course, and all proper and reasonable means afforded to these apprentices to become thoroughly instructed in all branches of the machinist trade, and in special cases in such other lines of work as are connected with electrical manufacturing. Apprentices entering on this course under 21 years of age are required to serve four years, and three years if over 21 years of age. To those apprentices who satisfactorily serve the entire term of their apprenticeship the company grants a bonus of \$100.

Patternmaker's Course

This, as in the case of the Machinist Course, is of four years' duration, and similar conditions apply to it.

Moulder's Course

This course is also of four years' duration and the apprentices are taught core making, bench and floor moulding in the iron foundry, brass moulding, and are also required to spend a certain portion of their time upon the charging deck of the cupola in order that they may get an insight into all phases of foundry practice.

With reference to your second inquiry as to the faults of our system, I would say that in the majority of cases we find the system to be all we could desire, and that it has produced some very skilful engineers, machinists, and other tradesmen, many of whom upon completion of their apprenticeship stay in the regular employment of the company, and in the few cases where the apprentices do not fulfil their entire term we believe it to be not owing to any fault in the system but rather to the fact that we or the apprentice discover after he has worked some time at the trade that he is not suitable for the work and should take up some other calling.

Cowan & Company of Galt, Limited, Galt

The system of apprenticeship we follow is simply to engage the young men for a certain term of apprenticeship, the term varying according to the trade they wish to learn, at so much per day, the amount increasing each year of their apprenticeship, with a substantial bonus when they have satisfactorily completed the term of their apprenticeship. From our experience we find this system has been more satisfactory than any we have tried, as it puts the young man on his honour to fill his apprenticeship satisfactorily, and he has the bonus at the end of his term, which makes him independent to a certain extent at the end of his apprenticeship, and at the same time it puts the employer on his honour to give the apprentice every opportunity to learn his trade and turn out a first-class mechanic.

We have discontinued binding our apprentices and requiring them to give security for the faithful completing of their apprenticeship, as we found it did not work satisfactorily; for, if the apprentice became dissatisfied, holding him

under security made him dislike his work, and he was not learning his trade and was no use to his employer, and also no manufacturer wishes to put the law in force and collect from him security if he was not filling his apprenticeship faithfully.

As to your second question: We have no faults to find with the system except the deficiencies in human nature which you cannot overcome. If the apprentice becomes dissatisfied it is no use in his own interest to learn a trade that he doesn't like and he would be no use to his employer who is endeavouring to teach him that trade, and he would forfeit his bonus.

Dennis Wire and Iron Works Co., Limited, London

E. R. Dennis, President.

1. We have no apprenticeship system in our industry. Boys will not enter a shop under a system of apprenticeship, and, further, such a system is almost impracticable in industrial establishments as at present organized.

During the past few years we have been obliged to obtain from time to time skilled men from the United States and Great Britain. Our young men here seem to lack both the preparation and inclination to be good mechanics.

2. In our industry we prefer not to take boys under 16 years of age.

In my opinion the preparation the boys receive in our public and high schools here, while it may be most useful as preparation for a professional or commercial career, is very unsatisfactory for the boy who desires to take up mechanical work. I think the education in our public schools should aim to develop the particular genius which every individual boy possesses, and allow him to express himself by working at wood working, carving, modelling, hammered metal work, etc.; not so much that he shall be taught to make certain things, but that his ability as a craftsman may be developed and that he may be given an opportunity of discovering for what he is fitted before too late.

In our business we depend more on skilled men and less on machine work than do many other industries. Boys should be started at an early age with manual training in the public schools, and between the ages of 14 and 16 given instruction in a more advanced institution, connected with the high school.

The call for skilled mechanics is becoming increasingly insistent, and unless some system of manual and technical training is soon instituted in our schools I am at a loss to answer the question, "Where are to-morrow's skilled men to be found?"

3. It seems to me there are practically no present means of preparing skilled workmen.

A young man enters a shop with the single idea of getting as much remuneration for his services as possible. It is, therefore, necessary to keep him at some special line of work or operating some special machine, so that he becomes a machine hand, a specialist, but not a skilled mechanic, who is an all-round trained man.

As our factories are at present organized, the training of apprentices in them is now out of the question. We are endeavouring to make up the loss caused by the passing of the apprenticeship system by conducting a night school for our employees. In London at the present time there are practically no means available for a boy or young man to learn a trade properly and become a thorough, skilled mechanic. There are, of course, a few handy men being turned out who may claim to be mechanics, but they are not such in any sense of the word.

The only remedy I can see is in the establishment of manual training in all our public schools, where the boys can be started young and be given the training necessary to become proficient in the mechanic arts. In these manual and technical training schools the boys would also get an inclination to enter trades, which is not the case at the present time.

We are conducting a night school in connection with our factory; from twenty to twenty-five men are in attendance out of a total number of one hundred employees. Admission to the classes is not limited to beginners; any man in the shop who desires to become more skilful in his work and acquire some technical knowledge is invited to attend. Designing, geometry, mensuration, draughting, construction, reading blue prints, laying out work, etc., are taken up. Once a month we have a special meeting, addressed by outsiders, on practical subjects. The young men who are attending the classes are acquiring manual dexterity at their work during the day, and technical knowledge in the evening. Classes meet one night per week, but the men are given problems to take home and work out. The work done in these classes enables us to detect ability in individuals among our men that we should otherwise be unaware of, and we can place them in the positions they are best qualified to fill—to our mutual advantage.

Dodge Manufacturing Company of Toronto, Limited, Toronto

C. H. Wheaton, Manager.

We are glad to enclose to you herewith copy of the "Apprenticeship Articles" which we have adopted and which we have found to be the only effective means of procuring mechanics through apprenticeship. You will note that these Articles provide for a bonus to the apprentice who works out the full period. Also they provide for a forfeit or tax for the one who falls down. Furthermore you will note that the Articles call for the suretyship of the boy's parents, and we believe that if such Apprenticeship Articles as these were more universally adopted and the details of same strictly enforced that there would be more mechanics produced.

As to any faults or drawbacks through this system; we have not found them other than the general difficulty of persuading boys and their parents to enter into the contract, and we believe that the remedy for this must be by general education. We think that there are a goodly percentage of mechanics' sons who might reasonably be mechanics and do well. Also we believe that there are a lot of them who are unwilling to deprive themselves to the extent necessitated by the small wage possible during their four years of apprenticeship, which runs from 60c. per day for the first six months to \$1.50 per day for the last six months of the whole term of four years, but this must be the price which they must pay for their knowledge, and as a rule there are a great many of them who will not wait, preferring to make from \$1 to \$1.50 per day at the start, but very often do not get much higher than that and continue to be labourers or handy-men for the balance of their lives. Quite possibly there are too many boys who drift aimlessly into whatever happens to come along, and quite possibly monthly addresses might be given at the public schools by practical men to the boys. For instance a practical moulder might give an address describing the foundry trade in detail, pointing out the good points as well as the drawbacks and the possibilities, then a practical machinist might do likewise, also a practical pattern maker likewise, and so on. Then we believe that if at certain periods, such as the closing terms at the public schools, enquiries were made as to how many boys were going to stop school and start to work, and as to what they proposed to do, whether they were going to learn a trade or enter into a commercial life and so on, no doubt some good could be accomplished. Also in many cases certain boys through their physical make-up are best fitted for certain trades and businesses and they should be so advised and directed, no doubt often to the ultimate benefit of the boys.

P. W. Ellis & Company, Limited, Toronto

W. G. Ellis, Factories Manager.

We are pleased to know from your circular of February 21st that the Government is giving special attention to the proper education of youths who will likely be engaged in industrial enterprises; and trust that you will recognize the fact that our factories must secure their apprentices from those who have received only a Public School education. Our experience has been that it is very seldom a boy from the High School applies for a situation as an apprentice in our factories, and when they have they remain only for a short time.

We have always found it difficult to induce our apprentices after labouring all day, to improve themselves by attending night classes during the winter months, showing conclusively that lost opportunities during the Public School course are not likely to be supplied later on by a technical course in a purely technical school. Nor do we consider it wise to have the Public School course shortened and interfered with by the switching of children into the High Schools, by what is known as the Entrance Examination, thus sadly disorganizing our Public Schools, especially in the senior classes, where they should be exceptionally strong. We would also call your attention to the apparent lack of systematic training of the eye to form and size. We have tried in our establishment to give our apprentices drawing lessons, but have been compelled to give this up, owing principally to the lack of ambition shown by the apprentices themselves. Our efforts showed very conclusively that their Public School education along those lines had been sadly neglected. The artist who gave instructions, made the statement that of all the apprentices who entered his class, only two gave evidence of having previously received such instruction as gave them an idea of drawing; one having been educated in a Birmingham school, and the other in Glasgow.

What we want for our factories is apprentices who are made by their previous education, resourceful and strong. Think of a lad entering most factories, without any knowledge whatever of chemistry, or having had a fair introduction to the practical sciences. Let him take up any of the industrial journals, how stupid he must feel in reading many of the articles therein found, and how can you expect him to be at all ambitious when turned out of school with a finished Public School education, absolutely blind to his opportunities? When we know it is easily possible to secure such an education within the period of the age of fourteen, it seems criminal to deprive the Public School course of a finish adequate to the needs of our country's wage-earners. Go back thirty years ago to the old Toronto Model School, from which youths naturally left at the age of fourteen, and you will find a course at that time which would be an ideal one for youths entering the artisan field, which we are sure Principal Scott of the Normal would largely endorse.

In answer to your first question, "the system of apprenticeship we follow in our industry," we would say that we have two systems, one covering a full apprenticeship course of five years, and the other what is known as the industrial course of three years. We find the industrial course to be the most popular with the youth of to-day, and from the manufacturer's standpoint, it is usually the most profitable for him. We are enclosing you agreement forms covering both systems. We strongly recommend the full apprenticeship course, by which with properly educated youths who will know how, and who have the capacity for meeting business necessities by the aid of research, correspondence schools, reference library, etc., the general Canadian industrial welfare would be exceptionally improved and benefited.

Frost & Wood Company, Limited, Smith's Falls

F. Whitcomb, Superintendent.

The number of apprentices we have is very limited, only three in our tool room and sometimes we have some in our foundry; but there are none in that department at the present time.

In our tool room they serve four years, and we try and manage so that there will be one in each year.

In training them, we do our best to give them as much general work as possible.

Globe-Wernicke Company, Limited, Stratford

James J. Mason, President.

We have no regular system, as we find the three-year service does not work out well. We, therefore, engage our boys and push them along as fast as possible, advancing them as they improve. We find this works out better than a regular apprenticeship contract.

Goldie & McCulloch Company, Limited, Galt

We are enclosing you a copy of our agreement with our apprentices, which we require them all to sign, and under which we endeavour to teach them as well as we can the practical part of the mechanical business in the several lines in which we take them on. We make no attempt whatever to give them any technical education but confine ourselves entirely to the practical part.

This system, we have come to think, has a number of serious faults. In the first place, the pay that we give does not seem to be sufficiently high to get the right kind of boys, although we cannot, of course, say that even higher pay would get boys who have spent at least some time in the Collegiate Institute, as there seems to be a tendency on the part of all these to seek employment where they get quicker results and which they think will secure a superior social position.

We are also beginning to feel that to attract the proper kind of boys we must make some effort to teach them the theoretical part of the business to some extent as well as the practical, and the writer intends, as early as possible, to make some investigation with regard to what other manufacturers are doing along this line.

It would no doubt be a very great help if some system of elementary technical education could be devised by the Government to work along with the system of apprenticeship as now in force. In the issues of the "American Machinist" for January 6th, 1910, and for January 20th, 1910, this subject is discussed and a short description given of the co-operative system in use in Fitchburg, Mass., where the manufacturers and the School Board co-operate in giving alternate instruction in theoretical and practical work. We are rather of the opinion that this will be difficult to work in most places in Ontario, but if it could be done it would be a very great help. It probably would be easier for the Government to investigate the subject thoroughly and lay down certain courses for study and then leave the carrying out of this to the manufacturers. This might at first sight seem to be a slipshod way of taking care of the matter; but, as in a very short time it would result in the manufacturer who paid most attention to this getting the best apprentices, it would only be a short time before practically all were working in unison.

John Goodison Thresher Company, Limited, Sarnia

W. T. Goodison, Secretary.

We have instituted in our shop a system of apprenticeship by which each apprentice is articulated for a period of four years, no matter what trade he

wishes to take up. Of course, where the apprentice is, under the age, we get the parent's signature as well. We find this works very satisfactorily in most cases, but there are other cases where it is not so good. Our greatest difficulty is in getting the apprentices to serve their full term. Some of them, after they have served two and a half or three years, try to make some pretext to get the articles cancelled, as they think they can go and command a job on journeymen's wages. Apart from this difficulty, we find our system works very well.

Gurney Foundry Company, Limited

Edward Gurney.

We are apprenticing young men on the old principle, for three years, only occasionally. In some cases we take adults and bind them for two or three years, giving them a large percentage of the usual piece prices as soon as practicable. We find that as a rule the young boys are not seeking a trade as in former days. The art of moulding has been so largely simplified in recent years that it does not require the long application that it did formerly. From the fact that we cannot start young with apprentices as we did formerly we are not educating moulders as we once did. Practically there is no apprentice system applied in any large way in this industry.

Harris Lithographing Company, Toronto

S. Harris.

1. We use an Indenture Form binding the boys in the Mechanical Departments for four years, and in the Art Department five years, under a graduated scale of wages, and we have inserted a clause in one indenture, whereby we may (where merit deserves) increase the amount without cancelling the Indenture.

These lads are put under a competent man. They have an opportunity of observing the best methods, and are permitted almost immediately to do the easier parts of the work. In a very short time we give them actual work. Sometimes they spoil it, so that it has to be done over; but the experience quickly teaches them to be accurate and careful.

We find this to be much better than just giving them practice work, where it is immaterial whether they are correct or not.

We also advise them to go to technical schools, but this is optional with them. Some do, but we are of the opinion the majority do not take advantage of the opportunity. There is no doubt it would make them better workmen, inasmuch as they would have the theory and the knowledge of chemicals that would materially assist them in conjunction with their experience.

We have found this system to work very well, and our boys have been in practically every case successful workmen and very often have taken positions of trust over older men.

2. We do not know of any better system, and if the lads would take up the technical end of it we are of the opinion it is about as good a system as can be had.

We may say that we like to get the boys when they are about 15 or 16 years of age; not older than 16 years.

International Harvester Company of Canada, Limited, Hamilton.

A. A. McKinstry, Superintendent.

1. At the Hamilton works of the International Harvester Company apprentices are selected as far as possible from the sons of the men working with the company, or boys recommended by these men.

A regular scale of wages if paid, increasing every six months for four years, the rate of increase being greater for each successive six months as the term expires.

No written contract or bond is exacted other than that regularly used in the engaging of employees.

A verbal understanding is arrived at between the Company and the boy hired as an apprentice to the effect that the first three months he is on probation, at the expiration of which time he is retained permanently or discharged by the foreman, according to whether he has made good or otherwise. The boy also has the option during this time of leaving if he so desires. If both parties are agreed and the boy remains with the company, the three months' probation service applies on his first six months' term.

It is also understood that during the four years term served by the apprentice, he is to be changed around to get experience along all lines of the trade, and at end of term should be familiar with either machine or bench work.

2. The main drawback to above-mentioned system is that the company has no hold on the apprentice when he becomes proficient and gets offer of more wages elsewhere before his time has expired.

The remedy for this condition lies in the method of paying a lower rate of wages during actual service, and, upon completion of the four years' term, make the party a present in the form of a bonus of an amount equal to the difference between the lower rate and the regular rate or a little better for the time served, but of course in case of non-completion of the term the forfeiture of the bonus becomes effective.

Another point which can scarcely be called a fault is that a few complaints have been made by boys, to the effect that they were not changed about sufficiently, being kept too long on some of the minor jobs.

This condition is almost invariably the fault of the boy himself, as any apprentice who shows himself adapted to the work and pushes ahead, will as a matter of practical economy, be stepped up and put on better work, but when the boy is slow and laggard it is impossible to push him along rapidly.

McLaughlin Carriage Co., Limited, Oshawa

R. S. McLaughlin, President.

Answering your circular letter, we consider that facilities for securing a technical education are very necessary these days, when it is practically impossible to induce apprentices to put in their full time and thus learn thoroughly the trade which they select. We have found it practically impossible to get young men with patience enough to master the trade at which they start—they are so anxious to get along and make money. Our piece-work system may possibly be responsible for this, but by no means altogether so.

We are sure that any steps which may be taken by your department along the lines of creating means whereby a technical education can be secured for the average young man or ambitious young mechanic would be heartily supported by every manufacturer.

McClary Manufacturing Company, London

W. M. Gartshore, Vice-President.

The system of apprenticeship which we have followed for some years is that apprentices should be taken on for three years in the trade of moulding, and be paid \$4.50, \$5.50 and \$6.50 per week, respectively, if employed at day work, and if employed at piece-work at the rate of eighty per cent. of the standard board price for journeymen.

At other trades: Tinsmithing—they are employed for the same length of time, but there is no opportunity for piece-work. Pattern-making and machinist's work—they are generally placed on four years' apprenticeship, at the rate of \$3.50, \$4.50, \$5.50 and \$6.50 per week, respectively.

Each apprentice is under bond to the extent of one hundred dollars that he will complete his apprenticeship. Where they are under age, the bonds are furnished by the parents or guardians; when over age, the security is left with us in the shape of cash, sometimes paid in full, and other times deducted from their wages, and put to their credit, and paid to them on completion of their apprenticeship, with interest.

Notwithstanding the favourable terms on which young men can learn trades, there is a scarcity of supply. Boys prefer, apparently, to get employment at something more remunerative, without any disposition to qualify themselves for better positions later on.

Of late we have found more success in employing men, and in some cases married men, who have recognized the necessity of having a trade, but applications from those under age are very limited and the supply is not equal to the demand.

In case of a technical education we think boys could be induced to follow out those lines to which they are suited, as apparently they have no formed opinions on the subject, and, as a rule, take the employment that offers the greatest financial inducement for the time being.

John Morrow Screw Company, Limited, Ingersoll

J. A. Coulter, President and Manager.

We have really no system of apprenticeship further than that we make our boys serve four years. We do not allow a boy to start an apprenticeship with us until he has worked around machinery in our works for one year; the reason for this is that we have in days gone by found that after we have taken on some one to learn the trade of tool-making he had not the proper "bump" for this work. If we find a boy is mechanical and has ability along these lines during the time (a year or more) he is in our employ on other work, we then give him an apprenticeship of four years, crediting him with one year for the time spent as above indicated.

Our scale of wages is three, four, five and six dollars per week respectively for each year. From this we deduct 50c per week, which is handed to the apprentice at the completion of his term, and which he forfeits should he not carry out the full time of his apprenticeship. We have found this to work exceedingly well. By this method the young man has a little money with which to buy tools, etc., to start him at the end of his apprenticeship, and which would never have been saved except for this rule. Then, too, we find that this has a tendency to hold these young fellows until they have completed the term.

Ontario Engraving Company, Hamilton

C. R. McCullough, President.

1. We take a boy at say, fifteen years of age. If he is intended for the Artist Department he carries out sketches for submission to customers, learns to "prove" engravings, makes sets of letters, gets his hand in on the simplest class of design, is given medium class of design on showing progress, and finally graduates into the higher class of air-brush work on machinery, stoves, pianos, birdseye views, etc. In the Engraving Department a boy is taken at fifteen and delivers engravings to customers, sweeps up the workshop, gets mounting wood ready, assists the journeyman, and is assigned in due course definite duties to perform. The training is all-round. Consequently the worker is able to "fit" in in most departments.

2. Our plans as outlined above have worked well. The local Technical School has afforded real service in enabling juniors and improvers additional training in lettering, design, etc., in the evening classes.

If the Technical School conducted evening classes in Chemistry as applied to photography, the fault in our engraving apprenticeship would be remedied.

Geo. Pattinson & Company, Preston

Geo. Pattinson, M.P.P.

We are engaged in the manufacture of woven woollen goods, comprising tweeds, cloakings, overcoatings, and woollen dress goods. There is no system of apprenticeship in this country. Young people commencing work usually follow one branch until they become proficient. The woven branch of the woollen industry has gradually been reduced. At the present time mills in operation are situated at considerable distances from each other. In our opinion it would be a difficult matter to arrange technical education that would be comparatively beneficial.

Penmans, Limited, Paris

R. Thompson, General Manager.

We have no system; no proper apprenticeship can be followed to-day in our business in the towns in which we are located, since a boy or a girl wants a man's or a woman's pay on starting in at the business. Having that much money, they do not apply themselves to any particular work. They simply hold on for some time, spending too much time on the streets and at shows.

The answer to the second question is that under these conditions we cannot inaugurate a system. You will understand that in speaking in this way we are speaking generally, and what we say does not apply to all persons, but to the greater number.

Our skilled operators both in men's and in women's work become such from helping to prepare work for the older ones and eventually picking the work up of their own accord. They become skilled to the degree they apply their minds and energy.

Toronto Carpet Manufacturing Co., Limited, Toronto

Jas. P. Murray.

In the matter of the child's age when employed, we submit that the entire responsibility should be with parents. It is not the children or the employer who are to blame for under-age children sometimes found in factories. The parents force the children out to earn money and do all they can to make them look to be over fourteen. We have a system of swearing parents as to children's age, but even then the greatest care has to be practised.

We find so little ability in writing, grammar, spelling, and arithmetic that it is sometimes doubtful if the time at school has not been more than half wasted. In most of our cases the children who come to work in our factory are not from the more well-to-do class of public school pupils. The poorer workpeople take less interest in the attendance or the progress of their children at school. The teacher should be a second parent, as the school is but taking the parent's place. More men should be employed as teachers, particularly after boys pass into their ninth year.

It has always been found that in all kinds of textile industry, fourteen years is a good age to start learning the trade. A system of continuation schools should be a practical part of our educational system. When children enter a factory, it is taken that their school days are over. This is wrong.

The law compelling attendance at school should cover apprenticeship, and no child should be free from school attendance until the apprenticeship has been completed. This, of course, should mean that learners should be articulated apprentices; but as trade union's socialistic sentiment opposes this as an infringement on liberty, it might be difficult to have it enforced.

And further, the elementary special practical studies of a trade should be taken up for a given period after apprenticeship expires. This could be encouraged by scholarships and diplomas. The Universities of Cincinnati, Pittsburg, and others have introduced a way. May the method not be modified if it is found to be necessary?

The education of a youth should be as a building planned and constructed for and to a purpose. You cannot have a building by simply excavating and putting in the foundation, and letting the rest go up any way or in any shape. You may get a building, but it will probably be uninsurable.

These remarks have been made more lengthily because of the importance of the whole subject, and if points outside your three questions have been touched upon, it is because they seem to be necessary as a sequence to the work done in the Public School.

Welland Vale Manufacturing Co., Limited, St. Catharines

C. G. McPhee, Secretary.

The system of apprenticeship which we follow in our industry is that we usually work our men into positions that require particular skill by starting them as helpers. All our factory work is piece work and the different jobs require helpers or heaters. The piece work price is divided, 60 per cent. of the price going to the workman and 40 per cent. to the helper or heater. As we have vacancies, we usually fill them from among the men who have been acting as helpers.

Williams, Greene & Rome Co., Limited, Berlin

F. S. Hodgins, Secretary-Treasurer.

The majority of our help is female help and there is no regular apprenticeship. At the present time these girls come in and work for a period of about two months under a guarantee of a wage of about \$3.50 per week, and then they go on piece work.

In our cutting room we employ a number of men. We have no regular apprenticeship contract but it is understood that boys who come in here and do the rough work in the beginning learn the trade and it takes them from two to four years before they are put on piece work as experienced cutters. The length of time varies according to the growth of the business and our requirements which are, of course, affected more or less by the number of experienced people who leave us, as we educate practically all of our help here. The advent of the electric cutting knife in the shirt department has done away to a certain extent with the necessity of having cutters who have worked at the trade for a considerable length of time.

In our hand ironing department (hand ironing being considered a trade) we are obliged to employ all adults and, consequently, when they come in we pay them about \$1.00 a day for a couple of weeks while they are learning the first rudiments. Then they are put on to the rougher work on piece work and gradually advance.

Methodist Book and Publishing House, Toronto

Rev. Dr. William Briggs, Book Steward.

I. SYSTEM OF APPRENTICESHIP.—Apprenticeship in the various trades of our business lasts five years. As a rule our apprentices enter at the age of 14 or 15 years.

2. **FAULTS OF THE SYSTEM.**—We have no criticism to offer. If at the end of five years we do not consider the apprentice fully qualified in his trade he is not promoted. He has the option of remaining with us as an apprentice until better qualified, or leaving our employ. Our greatest complaint concerns the lack of interest evinced by the average employee in the welfare of the house for which he works. There is a great lack of intelligent initiative, and too much shiftless irresponsibility. This is possibly one of the undesirable consequences of business prosperity. Excessive demand for and restricted supply of labour is not conducive to the production of the best expert labour.

3. **AGE OF ENTRY.**—Apprentices in our composing room and bindery average between 14 and 15 years of age when entering our employ. In our press room the average may be two years older. With the exception of a limited percentage of our employees the personnel is constantly changing. This is accounted for by the ease with which employment may be secured by applicants of even mediocre ability.

4. **SCHOOL STANDING OF APPLICANTS.**—As a rule the applicants have reached the lower fourth grade of the Public Schools. The education they have received is very elementary, but when supplemented after they begin work by attendance at the city night schools it is sufficient to produce first-class mechanics.

5. **DESIRABLE AGE.**—Our experience has been that the best results are attainable when the employee enters our service at the age of about 15, after completing the Public School course. If they are reasonably bright, attentive, and ambitious, their success in their calling is assured.

6. **GENERAL.**—There is a tendency towards specializing in the printing business, just as there is in other enterprises. This may act as a deterrent in some cases in the attainment, after a reasonable apprenticeship, of an all-round competence in the different branches of the trade. As yet, however, this is not a serious matter. While I realize what a great many good results have been obtained through the growth of unionism, and would not be quoted as being in any way opposed to its development, yet it is evident that the consolidation of the men's interests has cultivated the idea that the interests of the employer and the employee are not identical, but rather, conflicting, and it has become more and more difficult to encourage in the employees of our mechanical departments that interest in the welfare of the institution that is so desirable, and in fact so necessary to its highest success.

W. J. Gage Company, Toronto

Book Publishers and Manufacturing Stationers

1. **APPRENTICESHIP.**—We have an apprenticeship system whereby we employ boys or girls, and have them instructed in the different branches of our trade:—

Compositors.—We are allowed by the Union two apprentices to the first five journeymen compositors, and one to each subsequent four or fraction thereof.

Pressmen.—One to each four journeymen or fraction thereof.

Feeders.—One to the first five, and one to each additional six or fraction thereof.

Bookbinders.—One to the first three, two to the first five, three to the first nine, and one to each additional four. Service for apprentices is five years, except for feeders and bindery women, which is 3 years.

2. **AGE.**—The large majority of our apprentices usually enter our employment when they are about 14 or 15 years of age, and we find that apprentices starting at that age are much more useful and adaptable to our business than those that come on older. **DESIRED AGE:** Those who have received a good

Public or Separate School education are far enough advanced to be able to readily grasp any of the technicalities of our manufacturing business.

3. **FAULTS.**—There are too few apprentices permitted by the Unions. Apprentices are not articulated and, therefore, are not under control, and in many cases the journeymen take no interest in teaching them.

A good system of preparatory education along technical lines should send us apprentices better equipped for learning a trade thoroughly.

Builders' Exchange, Toronto

P. L. Fraser, Secretary.

1. (1) The apprenticeship system does not prevail to any considerable extent in the building trades. In fact, some firms engaged in certain trades have no apprentices whatever, and do not encourage the system. On investigation I find the following existing conditions in the trades named:—

Stone Masons and Bricklayers.—Scarcely any apprentices.

Stone Cutters.—Some firms none, others with 1 or 2, some indentured.

Plasterers.—Most firms have 1 and 2, some indentured, but majority are not.

Plumbers and Steamfitters.—A great number of apprentices employed by all firms, but generally not indentured.

Carpenters.—Scarcely any apprentices.

Painters.—Nearly all firms have apprentices, but not indentured.

Electricians.—Few apprentices, not indentured.

Roofers.—The larger firms have 2 or 3 each, but not indentured.

(2) The means of training are: 1st, observation; 2nd, instruction from the foremen and men along with practical work. Some firms that have indentured apprentices insist that they attend the night schools, which are at their disposal.

(3) The defects of the present provision—it is difficult to point out the defects, but that the system is not satisfactory is apparent from the calibre of the mechanic of the present day production. From observation and investigation, it is evident that under the indenture system, the boy oftentimes becomes an unwilling apprentice, which means coercion and eventually failure. In case of dissatisfaction, redress is all on the side of the apprentice. Again under the present system, an apprentice may serve all his time without having an opportunity to learn all the features of the trade. The whole system seems obsolete and needs modernizing. During the last three decades, conditions have changed for the journeyman, and it is necessary to bring the apprentice to a corresponding level. Quicker methods of obtaining the knowledge he seeks must be adopted in order that he may be able to give service equal to the remuneration it is necessary for him to receive.

(4) In my opinion the establishment of a system of Trade Schools would greatly overcome the apparent dissatisfaction that exists under the present apprenticeship system.

2. Workers generally enter the building trades at about 16 years.

3. The majority of apprentices come from the fourth form of the Public School, but do not seem capable of applying their knowledge of the "three R's" to their work.

4. It is generally admitted that apprentices are most useful when starting at the age of 16 years.

John C. Boswell, Hamilton (Painter)

1. **APPRENTICESHIP.**—There have been no apprentices in ten years, except one who works with his brothers. We pick up our men by chance, and gradually work them into the trade.

2. AGE.—They enter at almost all ages. Their schooling has very little bearing on their work. Desired age: From sixteen to eighteen.

3. FAULTS.—It is largely a matter of chance if the workman becomes skilled. He must depend almost entirely on himself to pick up a knowledge of his trade.

A boy or young man might be helped by a short course in a Trade School.

Holtby Bros., Toronto (Mason Contractors)

1. APPRENTICESHIP.—Bricklayers' apprentices serve four years, and two are allowed by the Union to each employee.

2. AGE.—Apprentices enter under eighteen, usually at fourteen or fifteen. Desired age: The Public School training is sufficient for ordinary needs. Our apprentices follow up the work in a Technical School, and a better grounding in Public School on these lines would be an advantage.

3. FAULTS.—Technical studies have not until lately been held up as a desirable field of endeavour as compared with what are considered professions. Under the present system a great many are put to work at a trade when they fail to make good in school, and in this they may follow their natural bent. If they had been allowed to exercise their abilities in this direction under a system of manual work, they might have absorbed considerable working knowledge and a basis upon which to continue special courses in connection with their trades.

Adam Clark, Hamilton (Plumbing and Heating)

1. APPRENTICESHIP.—Apprentices serve five years helping journeymen, but are not of much use until after having served seven years.

2. AGE.—About 15 years of age. A Public School education is good as far as it goes. Desired age: Seventeen years.

3. FAULTS.—No technical training, which, if they had it, would probably reduce their apprenticeship about two or three years, make better workmen, and raise the standard of work.

Keith & Fitzsimons Company, Toronto (Plumbers & Steamfitters)

1. APPRENTICESHIP.—We have apprentices for five years at \$3 per week, with advance of \$1 each year. Of late, we cannot obtain them as they are scarce, and we now employ boys at what wages we can.

2. AGE.—They enter at 16 years, which is about the best time for them. The education they receive in Public Schools is very poor, and not at all what they should have.

3. FAULTS.—The fault at present is in the time and pay necessary for boys. We have to pay them high wages and let them go when not wanted.

The labor unions are a bad element for the boys, as they incite them to ask for wages they are not capable of earning. The growing boys are young men, without the trade, and they expect to get high wages, but are not retained any longer than can be helped.

A. B. Ormsby, Limited, Toronto (Sheet-Metal Workers)

1. APPRENTICESHIP.—We don't have boys sign articles. We start them on a small salary, with an increase every year. At the completion of four years' time, if they have ordinary ability, they are practical mechanics and are worth the union rate.

2. AGE.—Boys enter our establishment at fifteen or sixteen years of age. Desired age: A boy of fourteen that weighs about 120 pounds is more useful to us than a boy of sixteen that weighs 105 pounds. We need good husky boys.

3. FAULTS.—The trouble with most boys that enter our employment is that they have no fixed idea what work they would like or what they desire to go at. If they happen to be passing the office and see the sign that we want boys, they come in and apply. If they last a week or two they are likely to stay with us; but fully fifty per cent. of our boys quit after working a week, and they then go around looking for another job, taking the first thing that circumstances put in their way. We would suggest that from the time boys are ten years old they be sent to a manual training school where they may get an idea of what they are adapted for and what they would like to go at.

Donaldson & Paterson, Hamilton (Carpenters & Builders)

1. APPRENTICESHIP.—We employ our apprentices for a term of three years, paying \$350 the first year, \$450 the second year, and \$550 the third year.

2. AGE.—Our opinion of the training received in the schools is that it benefits them. Desired age: About 17 years.

3. FAULTS.—The use of so much wood-working machinery. A young man should get into a jobbing shop.

W. J. Hynes, Toronto (Contractor and Relief Decorations in Staff, Cement, etc.)

1. APPRENTICESHIP.—For shop work an apprenticeship of four years. For contract work on buildings an apprenticeship of five years. I stipulate that all apprentices shall attend the night classes of the Technical School for the whole term of their indentures. Apprentices in shop are directly under foreman's eye. Outside they may be either under foreman or under some qualified journeyman at times. Other conditions of apprenticeship are as outlined in the usual indenture form.

2. AGE.—In shop I prefer them not over sixteen years of age. Outside the Union stipulates that an apprentice shall be under eighteen. Their preparation in the schools is practically nil, and I find it difficult to make them realize just how important to them their apprenticeship really is.

3. FAULTS.—There seem to be too many boys set to learn a trade because they are thought too dull for office or professional life. If connected with a large employer they necessarily receive less personal attention from that employer, while if connected with a small employer they may receive more personal attention, but in the latter case the opportunities for seeing the best class of work are not so good. Would look to Technical Schools, free from Union control, as a means to encourage clean living, right thinking and ambition. Present instruction deals too much with subjects which apparently do not induce real thinking on the part of the student. The average apprentice on the work does things without reasoning out the why.

Grand Trunk Railway System, Stratford Shops

R. Patterson, Master Mechanic.

In Stratford we have about one hundred and ten apprentices at the present time, and we put these boys through a five years' technical course.

We have great difficulty in getting lads fifteen years of age who are competent to pass the examination for entrance to our works, particularly in mathe-

matics and spelling; though our requirements go only as far as decimal fractions and ordinary words are given to them for spelling test. In going into this matter I find that the boys and girls attending the Public School up to ten and eleven years of age are able to write, read, and spell fairly well, and will do up to long division or decimals accurately, or fairly so. After this period, and while they attend school for three or four more years, they are not able in a great many cases to do multiplication or division correctly, have practically no knowledge of drawing, geometry and mensuration, and their writing is not improved, nor in some cases their spelling.

For commercial and industrial pursuits these requirements are absolutely necessary to the success of the young man, and it appears to me that after he arrives at the age which I have mentioned, so many subjects are taken up by the student, that the real solid foundation of the education which he requires becomes a secondary consideration and he branches off into other subjects which are practically a preparatory step for the university. It seems to me that the whole trend of our education is based on the principle of giving them a *general knowledge* for higher educational purposes. Now, this principle may be all right for the purpose for which it is intended; but it is very detrimental to the average student; for, when he leaves school at the age of fifteen, he has not really got a good solid foundation to work on, but only a general smattering of various subjects. Could these boys stay at school until they are 17 or 18 years of age, this system would probably be satisfactory; but, as the majority leave between the ages of fourteen and sixteen, they are handicapped for commercial or industrial pursuits in the matter of their education. I would, of course, prefer to have these boys remain at school until they are seventeen or eighteen years of age, so that they could get a good education, but, as before stated, this is very often not possible with the large percentage of the boys, whose parents cannot afford to send them to school for so long a period.

I think pupils are rushed through the schools too fast in the endeavour to have them get this higher education, and also that the average boy is not considered as much as he ought to be in school life. You will find that, at a school where there are two or three brilliant scholars, the boys who pass with honours receive special attention, and a great noise is made if a few of these scholars get high marks, while a large percentage of the scholars are away below the average. Now, in school, as in every other sphere in life, the bright scholars will take care of themselves. It is the scholar that is a little below the average or only up to the average that needs coaching and special attention, and there should be some means of taking care of this class of students. Teachers are often judged by the number of scholars they can cram through to get high marks at the examinations or pass into the higher classes. What I want to emphasize is that more attention should be paid and longer time given to the scholars to get a good grounding in a practical education, and that more attention should be paid to the scholars who are not brilliant.

Another difficulty is that in the public schools boys are taken only as high as the fourth book, and a great many people are under the impression that when a boy gets into the fourth book he has sufficient education, and the boy himself begins to feel that he should then go to work. This is a very critical time, and is just when he needs most attention. We should have the fifth book in our public schools, or it should be taught free in our high schools, under the same conditions as the fourth book in the public schools. To sum up: I believe that it would be of great assistance to our technical education if these boys were taught to a greater extent, reading, writing, spelling, mathematics, drawing and mensuration, dropping some of the other subjects which are merely a preparatory step to a higher education. We find, when boys come to us from the Public Schools or in some cases from the High School, they will only make from ten to twelve per cent. when we test them in mathematics at the first examination in practical questions, but after we put them through a course of practical six months' work, a class will average from 70 to 75 per cent.

With regard to technical training, you are conversant with our system at Stratford, and I believe that this system should be carried out throughout the whole country; that is, that manufacturers should be induced to take up the apprenticeship question, arrange for preliminary examination before they are allowed to enter the service (this would be a great incentive for boys to qualify), and give them an education while in the service along with other practical work. *This would soon make competent foremen and superintendents for the different manufacturing industries.*

Some means should be devised by which the government would give a grant to the establishment taking care of a certain number of apprentices, and eventually scholarships could be given so that the boys who desire to have a more advanced education might go to the university for one year or an advanced technical school, such as the government should build in the different large cities. By this means a system of technical education would be spread all over the country, all the manufacturers would be interested in it and it would be developed rapidly and could be put into operation almost immediately, with the co-operation of the manufacturers and with a minimum of expense to the government.

II. OPINIONS OF EDUCATIONISTS

Dean Pakenham of the Faculty of Education, Toronto, late Principal of the Technical High School, Toronto

As a preliminary to a reference to some of the difficulties attendant upon the organization of technical education in Ontario, a few general observations are offered.

The situation does not justify an over-sanguine temper and should not provoke to an over-hasty act. Discontent with industrial conditions has persisted through the centuries and, despite all man's efforts at reform, it will persist. Education is not an infallible remedy. Industrial education will not eliminate the industrial misfit. Over-zealous advocates of technical education often disparage general education, or often set one form of education against another. Book learning is set over against hand training, and the liberal arts over against the applied sciences. And yet both are essential. A democracy cannot persist in Ontario without a trained professional class. No man needs the liberalizing influences of the humanities more than the Ontario craftsman!

Nor should the situation provoke a very keen sense of guilt at Ontario's failure to provide technical education. Ontario has *not* failed. Looked at from one side technical education is concerned with the workers in rural centres and the workers in urban centres. In so far as rural workers are concerned, Ontario has little to learn from other lands in the matter of agricultural education. She has much to teach. Looked at from another side technical education is concerned in the training of those who *make* and of those who *sell*. In so far as those who *sell*, i.e., the merchants, are concerned, Ontario has long recognized her duty, has striven intelligently to perform that duty, and, apart perhaps from the higher or college form of commercial education, has achieved some success in the performance. Even those who remain—those who *make* in urban centres, i.e., the manufacturers, mechanics, artisans—Ontario has not wholly neglected. This bears repetition. Ontario has not neglected training for the industries. The first need of those industries is the trained leader. For the engineers, experts, directive minds of her industrial army, she maintains instruction in applied science, which is scarcely surpassed on this continent. The second need is the trained rank and file. The indispensable condition of such training is a new spirit and a new purpose in the existing schools. School curricula that have trained the aristocracies of Greece and Rome and the ruling classes of modern Europe will not meet the demands of a democracy whose interests are industrial and whose school attendance is co-extensive with the population. Recognizing the situation Ontario has set

about readjusting her school curricula and school activities. She has already opened a few technical schools and a considerable number of manual training and household science centres. She has reorganized her professional schools for teachers, with a view to serving an agricultural and industrial community, and she has added to, enlarged, and made more practical her Public and High School Courses in art, science, mathematics, as well as in the manual arts. Her rapidly expanding school expenditures, moreover, are another evidence of her sincerity in this regard. It is true that in the specific training of the rank and file of the industrial army Ontario has not moved forward rapidly. But her steps have been certain, and she has never retreated. Unlike other modern countries, she has never sent an expensive technical plant to the scrap heap!

The situation, moreover, will not permit of wholesale importations or imitations. Ontario cannot duplicate the organization that obtains in Switzerland or Germany, or even England. This is not the old world. Here the industrial population is sparse, and industrial interests are still subordinate to agricultural interests. Social conditions do not here favour the transmission of an occupation from father to son as a heritage, nor do political ideals permit paternalism in state control of parent or apprentice or employer.

The general situation, moreover, makes one or two things clear. The average parent needs a new sense of the dignity of manual labour, and the average ratepayer needs a new sense of the importance of technical education. That education will be expensive, and, therefore, possible only in the larger urban centres, and those urban centres will maintain that education with uncertainty and reluctance. Conditions such as these demand the vigorous initiative of the state, with money, expert advice, some official pressure, and much official missionary work!

Some of the difficulties that beset the training of the craftsman have their origin in the modern factory.

The evolution of machinery has resulted in the growth of an army of unskilled workmen as machine attendants, "improvers," handy men, shop assistants, and labourers. This army, in so far as it is recruited from those happy-go-lucky fellows to whom "sufficient unto the day is the evil thereof," will not accept technical education. Ambitious men, once drafted into its ranks, quickly attain to the fullness of their powers without technical education. Accordingly technical education, as it fosters ambitions and draws the recruits away from unskilled activities, becomes a questionable blessing in the eyes of the shop.

Modern competition, taken together with the disintegration of the apprentice system, has thrown a veil of secrecy over the activities of the workshop. The artisan does not know his employer or his fellow workmen, does not know the finished article of which he fashions a part, and is himself only a number. "No admittance" is written across the doors of the shop. "No admittance" is often written in spirit over its machines and its processes. Technical education cannot flourish in such an atmosphere.

There is hope for technical education in co-operation between school and shop. But modern competition makes co-operation difficult or well-nigh impossible. Strenuous work during the day leaves the workman too exhausted for effective study at night. The employer cannot afford to release the worker from the bench for study during the day. Nor can he permit, as seems increasingly necessary, the use of the shop for applications of school processes. The shop may need technical education, but under the stress of modern competition it cannot stop to give it, or even at times to reward it.

Some difficulties that beset the training of craftsmen have their origin in the schools.

Technical schools, be their organization what it may, must assume in their pupils an indispensable minimum of training in the fundamental subjects. So long as the leakage from the Fifth, Fourth, etc., and even Third school grades (i.e., between the ages 16 and 10) continues, this "indispensable

minimum" is impossible. In this school "mortality," with its attendant evils, lies the first problem of technical education.

Existing technical curricula are unsatisfactory. They are compiled by men who do not know the shops as if intended for schools of college rank and for pupils the majority of whom do not pass on into the shops. Here lies a second problem of technical education.

Technical instruction may be given in night classes or day classes. In so far as day classes are concerned, the call of the shop is so insistent that the boy cuts short his school training and passes on abruptly to the workbench. In so far as night classes are concerned, physical exhaustion, the need of social relaxation, night work in the shops, and discouraging progress, play sad havoc with attendance. Hundreds set forth in October with high hopes, but a wretched score or two reach the goal in spring time! To make attendance regular and continuous is another problem of technical education.

Man cannot teach what he does not know. No man can teach the shop who does not know the shop. This is a common pedagogic truth which has hitherto been overlooked. The teacher of mathematics, or science, or languages, has been set to teach the processes of the shop, and has failed. To create a new type of teacher is another problem of technical education.

High schools have a long history and noble traditions. They trained our fathers; they give us our professional classes; they add a fine flavour to our civilization. But technical schools are new, without traditions, as yet without successes, and therefore without prestige. Here lies implicit another and even graver task—to turn a due part of the tide of ambitious youth away from the High Schools and into the Technical Schools.

Other difficulties that beset technical education have their origin in the boy himself.

Hitherto the trades have been recruited in no slight degree from boys who, unsuccessful and unhappy in the schools, reject further education, or from boys who, as messengers, newsboys, elevator boys, delivery boys, are flotsam and jetsam upon the great sea of human activities. These boys must be made happy and successful in school, or must be given a steadying purpose in the work-a-day world.

The industrial misfit is the victim of an unwise choice of occupation. The parent, chance, pressing economic demands, are now the determining factors in this choice, while the one determining factor should be the fitness of the boy himself. The boy should choose his occupation, and should base that choice upon a knowledge of his own powers. In some way, and especially through technical education, the boy must be helped to find himself.

Dean Ellis of the Faculty of Education, Kingston, late Principal of the Kingston Collegiate Institute and Manual Training School

Judging from our experience in Kingston, and from enquiries made about the subject elsewhere, I am not at all hopeful regarding the success of evening classes in this Province under present conditions. The following reasons influence me in coming to these conclusions. I will state later some opinions that I have formed regarding methods that may be adopted that possibly would lead to better results:—

1. The apprentice or young workman does not feel the pressing need of gaining greater ability in order to improve his earning capacity. The unskilled workman at a machine can generally make wages considerably in advance of those prevalent a few years ago, and this earning power has gone ahead quite as rapidly as the cost of living has increased, so that he does not feel the pinch of even relatively reduced pay. Since there is no immediate pressure on him to undertake a tedious amount of supplementary work in order to earn a reasonable living, while particularly he has no family, or the support of that family

is not expensive, he lets the opportunity slip by until too many years have gone for him to recover the advantages of the lapsed opportunity, even if he wanted to do so.

2. It is a characteristic of the untrained man that he lacks staying power. Evening classes to be effective require a long course of concentrated effort towards a definite purpose. It would be easy to persuade many to enter on such a course, but any mere spurt of study cannot be satisfactory, because either boys or men who have been away from school for some time adjust themselves slowly and at considerable effort when they resume studies. In order, therefore, to make such advancement as will be materially beneficial to them, the studies must be both extended in time and intensive in character. These conditions will be met successfully only on rare occasions, and by the exceptional individual, when there is not pressure of economic necessity to compel the effort.

3. The conditions of the workshop are such that it is not reasonable to expect boys and men to attend evening classes. A day's work is not a suitable preparation for mental effort at night, for a tired body does not conduce to activity of mind. It, therefore, needs an unusual stimulus to cause those who are engaged during the day in work that produces a physical drain, to undertake a systematic series of night exercises that make a considerable demand on bodily energy. Beyond that, it is probable that in most cases such intellectual work is more exhausting for the mechanic than for the school-boy, because of lack of adjustment for the labour required.

4. Another element that has contributed to the failure of these attempts to give the essentials of necessary education to employees of industrial and commercial establishments has arisen from the employment of instructors who lack the proper point of view. The teacher who has been trained for ordinary school work is not content to treat the subjects for evening classes in the way they should be taken up. Even in technical classes in schools one of my serious difficulties has been to get teachers who would do the work, particularly in Mathematics, Science and Freehand Drawing, keeping the industrial application to the fore. When that application becomes an essential factor in the success of the teaching itself, and in the maintenance of attendance, the difficulty is increased. The instructors of evening classes should not only be expert teachers, but each should be a master of the industrial or commercial operations to which his instruction leads. This is necessary for economy of time and for the confidence of those attending.

5. Experience shows the attendance and work of evening classes to be irregular and sporadic. When this work is not done systematically and with serious and long-continued effort, there is little use in attempting to carry it on, for it is bound to result in failure so far as any profitable result is concerned, and to engender dissatisfaction, or even disgust, in the individual who does not know why he makes no progress. The work of such classes should, therefore, be systematic and continuous, two elements that have not been prominent in cases in which attempts have been made to give instruction to those engaged in industrial operations.

In my opinion, evening classes to be successful must be conducted in schools specially designed to give industrial training, and the curriculum should be made with the view of continuity and definite application of the knowledge and facility gained. The entire work should be vocational, should appeal to ambitious youths as worth the effort, and should be conducted by men who understand the conditions of the workman and are in sympathy with him.

Some arrangement should, if possible, be made to set apprentices free at least for the time necessary for this instruction, and if manufacturers would pay dividends for skill, and thus recognize efficiency, the problem would be much nearer solution. Meantime, lack of a feeling of need of evening classes, fitful attendance, scrappy courses of study, unfit physical condition, and teachers

of doubtful qualification for this duty combine to make any effort to conduct such classes under the present conditions a rather hopeless labour.

Technical schools properly equipped and staffed, situated in important centres, would probably be more successful, because of their aims, methods and influence.

Brantford Collegiate Institute and Manual Training School

A. W. Burt, B.A., Principal.

In reply to your enquiry concerning the work in our Technical and Industrial classes, I beg to state that in our day classes in Manual Training and general technical work, there is a much better attendance than last year. In the Industrial class, on the other hand, there is a slight decrease—from eighteen to sixteen—though the members of this class are on the whole much superior to those of the class of last year. In the evening classes there is also an increased enrolment, our accommodation being overtaxed in woodwork, metal work and mechanical drawing. Our past experience, however, has been that the attendance drops off when the winter sports begin, and when night work is being done in the factories, so that after Christmas, in the academic subjects especially, it is somewhat difficult to maintain a class large enough to justify the continuance of the work. Different plans have been tried in various places to secure continuous attendance, but none, as far as I can learn, have proved successful unless the managers of the local factories have co-operated with the schools. We shall try to secure this in some way next year, when our new school will be in use, and we hope a new enthusiasm will be aroused. We shall, however, I think, have to wait till positions in banks, offices, and stores are less easily obtained by boys of limited education, and till there is more discrimination between the rewards of skilled labour and that which is unskilled, or skilled in one finite branch only, before we can hope that many men exhausted by ten hours of monotonous toil will devote themselves to what, as far as they can see, will be of little pecuniary advantage to them. A recent experience will illustrate what I mean: A farmer who moved into town some ten or twelve years ago, a “handy man,” has been working since at one of our factories. He has been continuously producing one part of a certain machine, using a machine to accomplish this. He was shingling his house a few weeks ago, and informed me that he would have engaged a carpenter to do this work had not the factory been “shut down” for stock-taking; for he could earn more at his machine than he would have to pay a carpenter, i.e., more than a man who would have to spend three or four years in learning a somewhat complex and difficult trade.

The success of the Correspondence Schools is sometimes pointed to as an indication of the eagerness of the masses to secure instruction in technical lines. It is true that attractive advertisements and persistent well-paid canvassing secure them a large enrolment of students, but another incident will illustrate how far advantage is taken of the opportunities they undoubtedly present. When the Industrial Commissioners made their visit here, it was thought well to bring before them some students, and if possible some graduates, of the Correspondence Schools. In the whole city, with some hundreds of these students said to be enrolled, the work having been carried on for many years, only one could be found who had finished a course, two others who had done this having left the city.

It appears, then, that the great difficulty in Ontario will be, not to devise a scheme of Technical and Industrial training, but, at present at least, to secure and retain students. Workmen will have to learn that there are other rewards of efficiency than they now realize, and employers of labour must do more than merely urge the community to develop the skilled labour they require. Let me present a few more illustrative facts to show how slight is the attraction of

industrial life for educated boys. For our industrial class, i.e., the class organized with the direct purpose of preparing boys for the factories, we can only secure pupils (as I learn is the case in Hamilton also) by admitting boys who have not passed the Entrance Examination. Of some seven who left this class last year, only one is working in the shops, three are in banks, two in stores, and one, after working for some time in a factory, has a position in a wholesale merchant's office. I spoke to the latter a few days ago. He said that his prospects of making money are better than they were, and that his work is much more agreeable. Again, we had a boy who failed to gain his promotion in the Teacher's Course, but who had done well in Manual Training. I recommended his father, a prosperous foreman-moulder, to put him in the shops after a preliminary course in our Industrial class. The father replied that he was not going to let his son slave away his life in the factories as he had done, getting up early to breathe dusty air all day, and then going home too tired to do anything but sleep to prepare for a new day's toil. Those of our boys who have done best in the shops, and these, too, constitute by far the largest number there, are boys who have taken general work in the school. For example, a young man, who went as far as to the Matriculation Examination, has rapidly risen to the best position in the town in the trade he learnt.

My opinion is that little can yet be done in Ontario by way of direct preparation for industrial life, that what will be most effective till openings in easier callings are fewer is, not trade schools, as in the old world, where necessity urges men into any remunerative employment, but general courses in our schools affording ample time and opportunity for such subjects as Drawing and Manual Training, so that boys may be led to discover their capabilities, and thus to follow those callings for which they are best fitted. For successful, evening classes we need the co-operation of the manufacturers at least to the extent of recognizing in increased pay, limited apprenticeship or shorter hours, the effort put forth by their employees to improve their efficiency.

Hamilton Technical and Art School

J. G. Witton, M.A., Principal.

In our day school we have at present two classes of boys who devote all their time to technical school work, in addition to a large number of occasional pupils, whom, for the present, we may dismiss from the discussion. The attendance in these classes is small. This may be attributed principally to two causes, the chief of which, in my opinion, is the public's intense conservatism in regard to the educational programme. In the past, the pupil who passed the High School Entrance Examination, if he wished to continue his education, had to attend a High School, and the programme of studies offered there has been accepted as a matter of course. But while this programme offers a necessary, and no doubt very satisfactory, preparation for those who wish to enter teaching or one of the "learned" professions, I am convinced that it is of considerably less value to others, and especially to the many who spend only a year or two at a High School. These pupils, to my mind, would find a course such as is offered by this school to be of greater value to them, but for some time, I fear, it will be difficult to convince their parents of this. The same conservatism will prevent the public realizing the value of a course for girls which would include such subjects as arithmetic, English, cooking, sewing, design, etc. Possibly the prejudice in favour of a more literary training will wear away in time; it is unreasonable, perhaps, to expect a radical change to be effected quickly.

The High School course has an added advantage in presenting a definite goal to the ambitious student; when he completes his course his efforts are rewarded by a teacher's or a matriculation certificate. We are sometimes asked

what we have to offer our pupils on the completion of their course, and find that we are not in a position to give a wholly satisfactory reply. Some token of recognition by the Department of Education would likely stimulate the student and at the same time enhance the status of the school.

Other difficulties are those of obtaining suitable text-books, and securing teachers whose training enables them to view the academic subjects from the standpoint of their industrial applications.

Our evening pupils are under no such restraint as our day pupils, and their attendance is irregular. This irregularity might be corrected to some extent by the Government recognizing the work of the pupils as suggested above, or, if it could be accomplished, by an arrangement between the school on the one hand, and the employers or the labour unions on the other. One of the United States railroads, I understand, which has established schools for its own apprentices, gives "merit marks" to those pupils who complete their courses of study. This is part of a general system, for the same railroad gives merit marks to employees who, by exceptional service, advance the road's interests, and the winner of a certain number of merit marks is entitled to special consideration in the way of promotion and advance of wages. The scheme is susceptible, possibly, of wider application.

It might be well, too, for the Department to consider to what extent the co-operation of the labour unions might be secured to the advantage of their younger members and the general public. In establishing our course in printing, we have been promised the support of the local Typographical Union, and from the representations made to us we look for the Union to encourage apprentices to attend the class.

But while a better training of our artisans is to the advantage of both themselves and their employers, any system of public instruction is concerned chiefly with the public welfare. More complex conditions of living demand a broader training of our workmen. The following from "Modern Sanitation" (Sept., 1910), is to the point:

"Recently, in that city (St. Paul, Minn.), the plumbing board, at a meeting held in the office of the City Engineer, made a ruling, which has almost the force of a law, to the effect that hereafter, in order to qualify as a master plumber, the applicant must pass an examination as to his ability as a journeyman, must be able to prepare plans of plumbing work, and must be able to estimate on the plumbing in a building from the plans and specifications." How well the plumbers are qualified to meet these demands is shown by a further quotation: "A poll of those engaged in the plumbing business to-day would no doubt disclose the fact that not 10 per cent. of them can draw a plan, nor can all write a specification."

To revert to our own school—we find a good demand for instruction in those subjects which promise immediate benefit to the pupil, such as mechanical and architectural drawing, woodworking and machine shop practice, and very little interest in the academic branches, such as physics and chemistry, whose value, though no less real, is less apparent. Our classes for women, viz., the classes in cooking and dressmaking, have been well attended and the newly-organized class in millinery promises well. The attendance builds up somewhat slowly in the fall, is best in mid-winter, and dwindles in the spring.

Stratford Collegiate Institute and Manual Training School

C. A. Mayberry, B.A., Principal.

We have not as yet had any public evening classes in this city and I cannot, from experience, say anything on the subject. We have, however, been discussing the matter of technical education and I can speak of the conclusions we have arrived at. The Grand Trunk shops have a system of compulsory classes for its apprentices. These classes have been very successful and have

done much for the boys in the employment of that company. These classes, I understand, are general throughout the Grand Trunk system. I believe that evening classes for mechanics are not only feasible but very necessary under present conditions. There are many of the younger class of mechanics of the better class, who are ambitious enough to feel the need of some further training and are seriously handicapped by their meagre attainments in mathematics and drawing especially. These classes would supply the required training. There are many boys, no doubt, who perhaps would not benefit much by the establishment of such classes, but there would be provided the facilities for the more progressive class who are destined to become leaders among mechanics. I find that our manufacturers and employers of labour, generally, think this want of training is a serious drawback and are much concerned that opportunities for improvement should be given to young mechanics. I should not expect that any great number of young men in a place the size of Stratford would voluntarily avail themselves of the opportunities afforded. But a number of promising young artisans would do so. There is no doubt that the manufacturers would co-operate with the educational authorities in the work. If an Industrial School could be established to care for this class separately from our existing educational system, so much the better. It seems to be an opinion generally held among our manufacturers that many young mechanics after a few years' experience in the shops would avail themselves of a year or so in such a school. The benefits of such a training could hardly be over-estimated. All our employers of labour are thoroughly convinced of the urgent necessity of doing something at once to increase the efficiency and the general status of the mechanic. Suppose we could get fifteen or twenty of this class in Stratford to take up the work they need. Would not this be worth while? These men would become leaders in their field of labour, master-mechanics, foremen, etc. It requires, of course, time to develop such a system; it cannot be done without expense, but it would more than pay for the trouble.

I believe, however, that the great hope of the increased efficiency and of a higher standard among the artisans' class depends upon the education of the mechanic before he enters a shop, and that to this end the efforts of our Government and manufacturers should be mainly devoted. In this opinion I have the undoubted support of all leading manufacturers here. There is no doubt among them that the further the boy goes in school, and the better his general education, the more efficient and satisfactory mechanic does he become. There is an idea too widely held that a very meagre education is all the mechanic needs, and the great proportion of young artisans is drawn from the class which leaves school before even entering the fourth class of the public school. To remedy this serious state of affairs is the great problem.

If a Technical course were established in the High School along similar lines to a Commercial course, I feel persuaded that it would not be many years until the course would become fairly popular with the mechanic class. I am sure that the manufacturers would lend their efforts to carrying out this scheme and would recognize the diploma of our graduates having a two or three year course in such a way that many boys would be induced to continue their course along this line. I am assured by our leading manufacturers that it would be to their benefit not only to give their moral support to this plan but to encourage it financially by giving such apprentices a few cents an hour more than the apprentices who lacked the course. Especially in places where a Manual Training School exists could the High School undertake such work without adding new machinery to our present facilities. That the High School is the place to do this work is without doubt. The greater number of the mechanic class that could be induced to enter the High School, the more satisfactory will be the results. To bring the artisans closely in touch with secondary schools and to give them a desire for better general education is, in my opinion, the greatest benefit that can be conferred upon them. I was greatly struck

with this on visiting the G.T.R. shops the other day. I asked the master-mechanic to name to me the young men who are leaders in his shops. I had no difficulty in finding out that every young man named as being progressive and promising and taking the lead there had formerly been a student of ours. We have already a very small class of the nature and the character I have mentioned in our school, and from our short experience we are well pleased with it.

APPENDIX C.

For convenience in dealing with the questions discussed in my report, I give below in I. the provisions of the Schools Act for manual training, agriculture, household science, and technical education; and, in II. the regulations governing the distribution of the grants for manual training, household science, and special technical education and the qualifications of the teachers of such schools.

I. ACTS OF THE LEGISLATURE

An Act Respecting the Department of Education

Under "An Act respecting the Department of Education," the Minister administers and enforces the statutes and regulations respecting technical schools, and may make regulations for their establishment, organization, government, courses of study, examinations, accommodations, and equipment, the authorization of text-books and books of reference, and the qualifications and duties of inspectors, teachers, and directors of such schools. It is also his duty, subject to the regulations, to apportion, out of the moneys appropriated for such purpose, all sums payable under any statute or regulation towards the maintenance of technical schools.

An Act Respecting Public Schools

Instruction in Agriculture, Manual Training and Household Science

110.—(1) The council of a township may engage the services of a person holding the degree of Bachelor of Science of Agriculture or other certificate of qualification from the Ontario Agricultural College and approved of by the certificate of the Minister or of an instructor qualified as required by the regulations, to give instruction in agriculture, manual training and household science in the public schools of the municipality, and the council may levy and collect from the ratepayers of such municipality who are public school supporters such sums as may be necessary to pay the salaries of such instructors, and all other expenses connected therewith.

(2) The courses of instruction shall be those prescribed by the regulations.

(3) The board of a rural school section or of a union school section or a number of such boards may severally or jointly engage the services of any person qualified as provided in subsection 1 for the purpose of giving similar instruction to the pupils of their respective schools.

(4) The courses of instruction in agriculture, manual training and household science shall, as far as practicable, be open to all residents of the school section or municipality.

Manual Training and Domestic Science Classes

111.—(1) The high school board, the public school board and the separate school board, or the board of education and the separate school board, or any

of such boards in a city, town or village may enter into agreements with one another for the formation and carrying on of classes for instruction in agriculture, manual training and household science in connection with the work of the schools under the management of such boards, and for providing suitable buildings, apparatus and appliances for carrying on such classes, and the appointment of teachers therefor, and the proportion in which the cost thereof is to be borne by each board.

(2) The boards may delegate the management and control of such classes and the buildings, apparatus and appliances used in connection therewith, to such committee or committees as they may see fit, composed of members of such boards or of one or more of them, and such committees may if the cost thereof has been included in the estimate mentioned in subsection 4, procure from time to time such buildings, apparatus, appliances and material as may be deemed necessary for carrying on such classes, and may engage teachers therefor.

(3) The members of any such committee shall hold office during the pleasure of the board by which they are appointed.

(4) The committees shall annually, on or before the first day of February, furnish to each board an estimate of the amount required for carrying on such classes during the then current year, and the boards shall include in the estimates to be furnished to the council of the city or town the proportion of the amount so required, which is to be provided by the board, and the same shall be included in the school rates of the municipality and levied and collected therewith.

An Act Respecting High Schools and Collegiate Institutes

11. A high school board, a public school board and a continuation school board, or any one or more of such boards, may engage the services of any person holding the degree of Bachelor of Science of Agriculture or other certificate of qualification from the Ontario Agricultural College and approved of by the Minister, to give instruction in agriculture to the pupils of their respective schools.

23.—(2) Where an Agricultural Department is established by the Minister in a high school the council of the county in which the high school is situate shall, on or before the 15th day of December in each year, pay to the board of the school in which such department is established the sum of \$500, which shall be applied by the board to the purposes of such department.

An Act Respecting Continuation Schools

10.—(3) Where an Agricultural Department is established by the Minister in a Continuation School, the council of the county in which the Continuation School is situated, shall on or before the 15th day of December in each year pay to the board of the school in which such department is established the sum of \$500 which shall be applied by the board to the purposes of such department.

An Act Respecting Boards of Education

23. The provisions of *The Public Schools Act* and of *The High Schools Act* and of *The Act respecting Technical Schools* and of all amendments thereto, which are not inconsistent with this Act, shall be read as part of this Act, and so far as such provisions are inconsistent with the provisions of this Act they shall not apply to municipal boards or union boards.

An Act respecting Public Libraries and Art Schools provides that:—A Board may open evening classes for artisans, mechanics, workingmen and

others, in such subjects as may promote a knowledge of the mechanical and manufacturing arts.

The board in a city may with the approval of the municipal council, establish an art school within the city, and may conduct the same, subject to the Regulations, so as to promote the study of art or the purposes for which it is established; and all the powers vested in, and all the duties imposed upon the board with respect to libraries, reading-rooms and museums shall be applicable to an art school so established.

An Act Respecting Public Libraries

A Board may open evening classes for artisans, mechanics, workingmen, and others, in such subjects as may promote a knowledge of the mechanical and manufacturing arts.

The Board in a city may with the approval of the municipal council, establish an art school, within the city, and may conduct the same, subject to the Regulations, so as to promote the study of art or the purposes for which it is established; and all the powers vested in, and all the duties imposed upon the board with respect to libraries, reading-rooms and museums shall be applicable to an art school so established.

For such schools a Legislative grant not exceeding \$400 is provided, with a further sum on the basis of attendance and efficiency.

An Act Respecting Technical Schools

Her Majesty, by and with the advice and consent of the Legislative Assembly of the Province of Ontario, enacts as follows:—

Establishment of Technical Schools by High School Boards

1. The trustees of any high school or any board of education may, by resolution passed at a special meeting called for the purpose (of which at least one month's notice shall be given in writing to each member thereof), establish a technical school, or may change any high school already established into a technical school, providing that such resolution shall not take effect until ratified by a by-law of each municipality composing the high school district, and also by the county council (if any), required by The High Schools Act, to contribute the equivalent of the Legislative grant towards the maintenance of such high school.

Technical Instruction Provided by High School Boards

2. Subject to the preceding section, it shall be lawful for the trustees of any high school or board of education to provide instruction in the arts and sciences usually taught in technical schools, but particularly such arts and sciences as relate to the industries of the Province; the marketable value of the raw material used in manufactures; the chemistry of foods, dyes, and minerals. Instruction shall also be given in agriculture and domestic science, and in architecture, mechanical drawing and decorative design, and such other related subjects as may be found necessary to render the labours of the farmer, the mechanic and the artisan more productive. The buildings to be used for technical school purposes shall be separate and distinct from the buildings used for high school purposes. Any pupil not entitled to be admitted to a high school shall not be entitled to admission to any technical school established as herein provided.

3. The provisions of The High Schools Act shall apply to technical schools, subject to any regulations of the Education Department with respect

to the fees to be paid by pupils, the course of study, the qualifications of teachers, the use of text books, and the equipment of the school. The conditions upon which money voted by the Legislature for high schools shall apply to all appropriations made to technical schools.

Establishment of Technical Schools for Adults in Cities and Towns

4. It shall be lawful for the municipal corporation of any city or town by by-law to appropriate such sums of money as may be deemed expedient for the establishment of a technical school for adults within the meaning of this Act. All the powers vested in the corporation by The Municipal Act, for the purchase or expropriation of lands, or for leasing or repairing buildings, or for the erection of new buildings for the use of the municipality, shall be applicable to this Act.

Grant to Technical Schools for Adults

5. Towards the maintenance of such schools there shall be paid annually, on the report of the Minister of Education, out of any moneys appropriated by the Legislature for that purpose, a sum not exceeding the amount payable for the maintenance of high school pupils under the regulations of the Education Department.

Board of Management

6. The general management and control of the school for adults shall be vested in and exercised by a board of management, to be appointed as provided in section 9 of The Public Libraries Act. In cities and towns in which a public library has been established under Part I. of the said Act, technical schools for adults shall be under the management and control of the board of such library. Provided always that any technical school already established under by-law of a municipality may be carried on under such by-law during the pleasure of the municipal council, subject to the regulations of the Education Department.

Powers of Board, and Expenses

7. The board or the trustees (as the case may be), appointed under any by-law as in the preceding section provided, shall have the power to appoint such teachers, officers and servants as may be necessary for the purposes of the school, to fix their salaries and to assign them their several duties. For the payment of the salaries of the teachers, officers and servants, and for all other purposes of maintenance, the municipality shall have power to appropriate out of the general income of the municipality from any source whatever such sums of money as the municipality may by by-law determine. The expenditure of the board of management shall be subject to the same audit as the expenditures of the municipality.

Regulations of Education Department

8. The qualifications of the teachers employed in technical schools for adults, and all matters relating to the course of study and the equipment of the school, shall be subject to the regulations of the Education Department.

The Consolidated Municipal Act of 1903

This Act provides that By-laws may be passed by the councils of counties, cities and separate towns:—

10. For establishing schools for the training and education of artisans, mechanics and workingmen in such subjects as may promote a knowledge of mechanical and manufacturing arts, and for acquiring such real property as

may be requisite for such schools; and for erecting and maintaining suitable buildings thereon; and for improving and repairing such school buildings, and for disposing of such property when no longer required.

(a) The councils of any municipalities establishing such schools may appoint boards of trustees or managers to conduct the schools, giving them such authority or power for the management of the same, as the councils may deem expedient.

11. For making grants in aid of such schools as may be deemed expedient.

12. For granting such aid to art schools, approved by the Education Department, as they may deem expedient.

By the councils of counties, townships, cities, towns and villages:—

1. For granting or loaning money or granting land in aid of the Agriculture and Arts Association or of agricultural or horticultural societies as authorized by *The Agriculture and Arts Act*, or in aid of any association formed for the holding of a fat stock or live stock show or exhibition or any exhibition for the promotion or improvement of farming in any of its branches or departments.

II. REGULATIONS OF THE DEPARTMENT OF EDUCATION

Distribution of Legislative Grants for Manual Training, Household Science, and Special Technical Instruction

1. The plans of every building hereafter erected or of any room adapted for the purpose of manual training, household science, or special technical instruction, shall be submitted to the Minister of Education, and be subject to his approval, and a copy of such plans shall be filed in the Department of Education.

2. Subject to the provisions of sections 5, 7 and 8 hereof, every school maintaining a manual training department shall be entitled to the following annual grants:—

(a) A fixed grant of \$350.00.

(b) 10 per cent. of the expenditure over \$600.00 for teacher's salary or salaries, but so as not in any case to exceed \$100.00.

(c) 20 per cent. of the cost of equipment for each of the first five years, and thereafter of the annual renewals and additions.

3. Subject to the provisions of sections 5, 7 and 8 hereof, every school maintaining a department for household science shall receive annually:—

(a) A fixed grant of \$200.00.

(b) 20 per cent. of the expenditure over \$500.00 for teachers' salaries, but so as not to exceed \$50.00.

(c) 20 per cent. of the cost of equipment for each of the first five years, and thereafter of annual additions and renewals.

4. Any school under the control of a public, separate, or high school board, or board of education, or of a recognized technical school board, which is specially organized and equipped for giving instruction in the theory and practice of the mechanical and industrial arts and sciences, shall be entitled to receive out of any Legislative appropriation therefor, in addition to such sums as they may be entitled to receive under sections 2 and 3 hereof, such further sum as the Minister of Education may approve, based upon inspection and report, but so as not in any case to exceed \$750.00. To be eligible for this grant the building in which instruction is given, equipment, courses of study, and qualification of staff, shall be approved by the Minister of Education.

5. In apportioning the Legislative grants on equipments the maximum value recognized shall be (a) for manual training, \$500.00, (b) for household science, \$300.00.

6. The course of study, and the qualifications of every teacher hereafter employed, shall be subject to the approval and regulations of the Education Department.

7. The unit of distribution of the Legislative grant for manual training and household science shall be the time of one teacher for five hours on each of five days per week.

8. The grants mentioned in the foregoing sections shall be subject to such pro-rata increase or reduction as the Legislative appropriation therefor will permit.

9. No manual training or household science school or department will be recognized as efficiently equipped that is provided with accommodation for less than 12 or more than 25 students, at any one time, for practical work.

Qualifications of Teachers

Household Science

1. Subject to the provisions hereinafter mentioned, no certificate to teach Household Science shall be awarded after September 1st, 1904, to anyone who does not hold at least Junior Leaving or Junior Matriculation standing.

2. All institutions whose graduates may be recognized as teachers of Household Science shall provide, to the satisfaction of the Education Department, suitable courses of study as well as adequate accommodation, equipment and instruction, for students preparing to become teachers in this department.

3. Every student who desires to become a teacher of Household Science must take a two years' course of study in the department, but any person holding, at least, a certificate from one of the Normal Schools who completes satisfactorily a one year's course shall be awarded a teacher's certificate in Household Science.

4. Any graduate of the Normal College who completes satisfactorily a one year's course at one of the recognized institutions for the training of teachers in Household Science shall be awarded a teacher's certificate as a Specialist in this department.

5. Any person holding a certificate to teach Household Science granted by the Education Department shall be qualified to have charge of a department of Household Science under any High, Public or Separate School Board.

6. Certificates as teachers of Household Science shall give no legal qualification to teach any of the other subjects of the school curriculum.

7. No grant shall be paid by the Government towards a department of Household Science unless the teacher who has charge of such department is duly qualified as herein provided.

8. These provisions shall not apply in the case of teachers already in charge of the department of Household Science or to students preparing to be teachers of the subject who have been enrolled before the date of these regulations.

Manual Training

1. Subject to the conditions herein mentioned, the Macdonald Institute, Guelph, shall be the only institution recognized by the Education Department for the training of teachers in Manual Training.

2. The Macdonald Institute shall provide, to the satisfaction of the Education Department, suitable courses of study as well as adequate accommodation, equipment and instruction for students desiring to become teachers of Manual Training.

3. Any person holding at least a second class certificate from one of the Normal Schools, who completes satisfactorily a one year's course at the Macdonald Institute, shall be awarded a teacher's certificate in Manual Training.

4. Any graduate of the Normal College, who completes satisfactorily a one year's course at the Macdonald Institute, shall be awarded a teacher's certificate as a Specialist in Manual Training.

5. Any person holding a certificate from the Macdonald Institute as a Teacher of Manual Training shall be qualified to have charge of a department of Manual Training under any High, Public or Separate School Board.

6. No grant shall be paid by the Government towards a department of Manual Training unless the teacher who has charge of such department is duly qualified as herein provided.

7. A certificate as a Teacher of Manual Training or as a Specialist in the same department shall give no qualification to teach any of the other subjects of the Public or High School curriculum.

8. These provisions shall not affect any person who is now in charge of a department of Manual Training in any High, Public or Separate School, or who may be appointed by the Board concerned before the 1st of September, 1904: it being understood, that such persons shall have qualifications satisfactory to the Minister of Education.
